GAS JOURNAL

LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

PROPRIETORS: WALTER KING, LIMITED. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

Telephone: Central 6055. —— Telegrams: "GASKING, FLEET, LONDON."

VOL. CLXXV., No. 3302.] WEDNESDAY, SEPTEMBER 1, 1926. [78TH YEAR.

INSTITUTION NUMBER OF THE "JOURNAL."

The Special Number of the "JOURNAL," containing the report of the proceedings at the postponed Annual Meeting of the Institution of Gas Engineers, will be published on the 29th inst. The papers and discussions will have a large appropriateness to the problems engaging the attention of the gas industry at the present time. The record will be complete in all essential respects, and fully illustrated. All communications respecting the Special Number should be sent as early as possible.

EDITORIAL NOTES.

The Postponed Institution Meeting.

In three weeks' time, we shall be in a midst of the proceedings of the annual meeting of the Institution, with Mr. C. F. Botley, M.Inst.C.E., in the chair. There was, in view of the coal stoppage, full justification for the postponement of the meeting, having regard to the fact that no one could gauge the possible length of the former, and the effects in view of the nebulous labour situation. Upon every gas engineer and manager there reposed a heavy responsibility in directing his operations so as to keep the community he serves supplied with gas, and at the same time ensure the most frugal use of the raw material at his command, and generally in seeing that the whole mechanism of his undertaking underwent no disturbance even of a temporary nature. The gas industry, through its administrations, officials, and men, has (as we have pointed out on various occasions) well fulfilled its obligations, and has wholly justified, in the worst possible circumstances, the trust with which Parliament invested it. The industry has again earned, even if it does not adequately receive, the thanks of the Government for its national service in a time of grave emergency. But it has had to be done at great price and sacrifice; and, although the position has been much eased through the continuous inflow of coal from abroad, the financial burden has been heavily increased. There will be a large exchange of experiences, more or less privately, when the members of the Institution meet on the 21st inst.

There will be other matters under both individual and collective discussion which bear upon the problems of the industry to-day. When those problems are surveyed, two things emerge—one is that, if the industry directs its development along the proper channels, it will play a more imposing part than has ever yet been dreamed of in the future fuel supply of the country; the second is that there is no question the industry is definitely passing from its old into a new world of conditions. It is for its men to legislate accordingly. The fuller the appreciation of this, the better for the industry. There will be occasions during the proceedings at the meeting when contributory matters will be under discussion; and we hope that to them the President will arrange to allot the greatest possible time for consideration. We particularly refer to the joint paper on "Service to the Consumers," in which Mr. John W. McLusky will deal with free inspection and maintenance, and their importance to the industry, and Mr. W. B. McLusky will treat of the value of a more scientific system of charging than we have in the flat rate, with simple discounts. A companion communication of considerable value will be that of Mr. A. W. Sumner on "Distribution at High Pressures," which will give those with experience of linking-up gas-supply areas, and thereby displacing uneconomical manufacture, an opportunity to impart the results, and so help forward what we believe to be a good policy for both the industry and the public. In this connection, bulk supply must not be overlooked. These contributions are big with importance as regards wider enterprise and solidification in the industry.

The address of the President has already been published; and so has the annual report of the Council. Among the other technical fare there will be a contribution by Mr. C. H. Rutter on "The Development and Reconstruction of the Portslade (Brighton) Gas-Works;" and one by Mr. T. F. E. Rhead on "An Investigation of Some of the Factors affecting Carbonization in Continuous Vertical Retorts." There will also be the report of the Advisory Committee on Education, which will be presented by the Chairman, Mr. F. W. Goodenough, C.B.E. The Fifteenth and Sixteenth Reports of the Gas Investigation Committee will be brought before the members. The former will deal with "Methods of Testing the Products of Combustion from Gas Appliances," and the latter with "Studies in Carbonization: Part I., Influence of the Size of Coal." The report of the Refractory Materials Committee will be presented by Mr. J. P. Leather. An important contribution will be the Institution Gas Research Fellowship Report on "The Influence of Ash Constituents in the Carbonization and Gasification of Coal: Part II., Gasification of Special Cokes in Steam," by Mr. C. B. Marson, M.Sc., A.I.C. (Gas Research Fellow), and Prof. John W. Cobb, C.B.E., B.Sc., F.I.C. (Livesey Professor). That is a good programme, giving as it does a valuable mixture of administrative and technical problems for discussion.

The visits and the social side of the programme remain as formerly announced. There will be the reception by the President and Miss Botley; and probably, being in the third week in September, the succeeding dance will be accompanied by more congenial temperature conditions than might have been the case in June. There will also be the long anticipated visit to Hastings on the Friday, when the members will be the guests of the Chairman and Directors of the Hastings Gas Company.

Deception and Threats.

OUTSTANDING from the incidents of last week in connection with the coal stoppage are three things. First, and least important as the result showed, there was the intimidation and cowardly attacks upon men who prefer work in the pits to continued idleness; but this was quickly ended by the protection provided by the police. More important, and conspicuously eloquent in its revelations, is the deception practised on the miners—with the view of stopping the trek back to the pits, and gaining time for the Miners' Federation—that the Executive had something new up their sleeves, which would result in an arrangement for the immediate return of the men to work. The third incident is that the Executive of the Federation are now threatening (probably they have not the power to carry it out) to end the return of the men to work by flooding them out of the pits by the withdrawal of the safety men. The deception and the menace are the clearest possible declarations that the Executive are driven into a corner, and have not sufficient commonsense or strength to acknowledge that their policy (which disclosed from the start a deficiency of mental capacity) has been in vain, and that intractable economic circumstances cannot be subject to impossible conditions. But they are cute enough to know that any such open acknowledgment would mean the closing of their careers as labour leaders or misleaders, and eviction from personally comfortable berths. The leaders are now keen to save themselves and the Federation which give them power and decent offices; and so they are warring against the slow but sure return to the pits of the miners who have been so painfully fooled by them.

In connection with the deceptive statement to the men at the beginning of last week—that new plans were ripening which, with a few days' more patience, would result in the policy of the Federation ending successfully—a great deal of mystery was displayed by the Federation Executive. But it turned out that the only thing up their sleeves was the same old programme. An interview was sought with, and granted by, Cabinet Ministers; but the stale requests were preferred, that there should be a further subsidy or loan to enable the industry to be run on the old lines while reorganization was being carried through, and then, and not till then, should wage conditions be discussed; also that there should be no alteration of hours, and only national agreements. Nothing new or constructive was put before the Ministers, who, through the Chancellor of the Exchequer, told the miners' representatives plainly that all further aid from the public purse had passed from the sphere of practical politics. This express determination of the Government will be endorsed throughout the country, other than by labour extremists. Any further financial succour would only mean (even though all the men went back to work, or as many as employment could be found for) that there would be another period of unsettlement, and more fighting when the subsidy came to an end. The miners' leaders also heard that one thing which has astonished the Government is the inherent power of the country to carry on in face of a stoppage of this kind, except in certain of the great basic industries. To give this proof of vitality has been a costly matter; but it had to come. The unpatriotic policy of the Miners' Federation has been directed to bringing the country into subjection to their will by leaving no stone unturned to cripple it; and yet they are quixotic enough to think that the country, which has helped them so much, and has lost so heavily through them, would submit to further squeezing. The miners must now see that their leaders are not omnipotent, and that the country is the more powerful. At the interview, Mr. Churchill said: "There is no doubt whatever that "we are in a position where we have no difficulty in carrying on the life of the country, and a large proportion "of the trade of the country, and of all the vital services. "As to the prosperity of the country, I agree that there "is suffering every day; but, as far as carrying on for "another six weeks or two months is concerned, there "is not the slightest compulsion or pressure on the "Government such as we should have imagined would "have been operating." The Miners' Federation are aware now, if never before, that they are incapable of bringing the whole nation to subjection; and this effort of theirs will brace-up the people against any further essays in the same direction.

Now for their *dernier ressort*. Since the abortive interview with representatives of the Government, more men have returned to the mines; and, empty words having failed to do more than temporarily retard the flow, the only thing left for the Executive of the Miners' Federation is to threaten the extremely disastrous course (not only to the industry generally, but to the miners in particular) of withdrawing the safety men, to make work impossible. If this was done, the Government would have to put into force their own effective resources to prevent the injury which would result. But at present we have only the threat. The determination as to putting it into execution fortunately does not rest with the Miners' Federation, but with another body—the Federation of Colliery Enginemen, Boilermen, and Mechanics. In this strike, the Executive of the Miners' Federation and the whole Trade Union world have had one of the greatest eye-openers ever presented to them. It has shown the futility of strike action, and the costliness to the participants, in seeking to impose unjustifiable claims; it has also demonstrated that the harm inflicted is greater to the industrial workers (who are the members of the Unions) than to any other part of the community. Advances in the organization of the world's system have been proceeding in the passing years, and have made communities less pregnable to mass labour movements than has hitherto been fully appreciated by the labour leaders. Even enginemen, boilermen, and mechanics for colliery machinery are not a specialized class; there are many other men who are skilled in the same classes of work who would be glad to step from the ranks of the unemployed into good and constant employment. The fact is worth noting.

However, the declared view of the Miners' Executive is that they must fight on; what their private views are, may be taken to be of an altogether different order. They see collapse and disaster before them; they know that the prolongation of the strike means the turning of the scale of opinion on to the side of district as opposed to national settlement; they know, too, that the owners are strongly opposed to a repetition of national settlements, for it has only been during their application that we have had this repeated unsettlement in the coal industry. Moreover, the regional economic conditions of the industry are hostile to common rule and control in labour matters. Not knowing what is before them, the Federation Executive are scouring the world for money. There is the mission to America; and now—it is pitiful to see the debasing lengths to which the Executive will go—emissaries have been sent to Russia to try to secure from the poorly paid and long-hour workers there further aid for men who work comparatively short hours (when not on strike), and who are rich compared with the workers of Russia.

While there is this imbecile misleading of the British miners, the miners in other countries are making good use of their opportunity. Including outcrop workings, the production of British coal is at present upwards of 300,000 tons a week; and imports total nearly a million tons a week. By the first week in July, the total quantity of coal imported had been rather more than 1,200,000; and since then we have received 5,457,000 tons. There has been a gradual increase. In the week ended July 10, the quantity landed was 521,000 tons; July 17, 600,000 tons; July 24, 650,000 tons; July 31, 850,000 tons; Aug. 7, 950,000 tons; Aug. 14, 970,000 tons; and Aug. 21, 916,000 tons. The quantities can be enlarged should there be the occasion. But, of course, price is a factor in demand—particularly for industrial purposes.

Field of the National Fuel and Power Committee.

IT is impossible at present to say anything much about the work which the National Fuel and Power Committee will have to take in hand. It is an old and complicated realm in which they will be conducting their explorations, and one in which things have been allowed to grow in a more or less haphazard manner. Every industry and every user has followed very much its or his own inclina-

tions as to fuel utilization, and the provision of heat and power; for them there has been little set guidance—only old independent practices to follow, with improvements as they have been made available. Never have the questions involved been thoroughly taken in hand from the national point of view; but, from the advisory standpoint, they are to be now, and probably it will be found necessary for the Government in some respects to convert recommendation into legislation. However, the Committee have not yet commenced operations, and will not do so immediately. When they do, they will soon learn, as they no doubt already expect, that their findings and solutions of existing problems will only be the stepping-stones to other developments, and their work will have to be permanent. Certain it is that it will, through (as it presents itself to our mind at the moment) its very largeness and chaotic state, have for some time to come to be more or less continuous, in order to produce, as early as possible, the beginning of salutary effect. Otherwise, no great impression will be made upon the existing condition of things; and matters will become still worse.

The Chairman of the Committee (Sir Alfred Mond, Bart.), we understand, is well satisfied with the composition of the Committee, and the expert knowledge which it makes available in the many branches of industry. It has not, of course, been possible for the Committee to have a preliminary meeting. Sir Alfred is now in Canada; so that a little time will have to elapse before the lines of procedure can be discussed and defined. But before Sir Alfred left this country, he made it clear, in a conversation, that he, at any rate, has no misconceptions as to the vastness of the task he and his colleagues are undertaking. He says they will be investigating the most economical use of fuel in all its forms in industry, and possibly in domestic service. They have a wide field of research before them—including, for instance, the improvement of existing practice in the utilization of steam, the relative advantages of gas, electricity, and oil, and their positions in our system of affairs. There are also many interesting points regarding the possibilities of better or more suitable qualities of coal for special purposes, the losses which occur in the transportation of coal from its cutting to the time it reaches the consumer; and the conversion of coal into fuel, oil, motor spirit, and other products. In short, the field offers scope for observation of a continuous character; for invention and scientific research in all countries are always creating new aspects, and changing the economic relations of one form of power production compared with another. Thus, we see, Sir Alfred is under no delusion regarding the magnitude of the task the Committee are undertaking in the national service. But there must be no idea that anything of a revolutionary nature will shortly result. We have to take the existing order of things, and to promote ultimate change from it (if necessary and capable of accomplishment) by temperate evolution, otherwise we shall only be courting a transition period of chaos. That has to be avoided.

Revolt of Tenants in All-Electric Houses.

THERE have been many pilgrimages to the Eltham housing estate of the Woolwich Borough Council by members of Housing Committees of other authorities. On this estate the tenants of the houses are supposed to cook and do other things by electricity. The delegates have been, and have seen; and everything (so the stories have gone) in the Eltham garden has been lovely. The testimonials that have been given in the reports have been to the effect that there is complete satisfaction with electricity on the part of the Eltham dwellers. It all reminds us very much of the pilgrimages of labour men to Soviet Russia, where they have evidently been shown what they wished to see, and have not been shown what would—at any rate, we hope so—have been distasteful to them, and to Britishers at home. Their reports have been favourable to the lines of current political development in Russia. The electrical and housing pilgrims to Eltham have returned to their homes, and have presented a beautiful picture of the fitness of electricity for people occupying dwellings provided on corporation housing estates. The people have been satisfied with both cost and performance; and that is precisely the statement that the electricity management have desired the pilgrims should make in the interests of the electricity undertakings, and not of the victims who would be allowed to take up electrically conditioned tenancies in the Council houses. But an exposure of facts has been made in the "Kentish Mercury." The Woolwich Council will not allow gas in the houses; they will only permit coal grates, if there is dissatisfaction with electric cooking. No less than 300 tenants have signed a petition to the Council condemning the inefficiency and expensiveness of the electric cookers, averring that they are beyond their financial resources, and claiming the rights of other free Britishers to use gas or electricity as individually desired. But the Woolwich Council are deaf to their entreaties; they will not waive the agreement into which they compelled the tenants to enter. The tenants are not going to allow the matter to rest there, if they can find means of showing the Council that they have not the power to compel them to be the slaves of their electricity concern. The matter is alluded to in our "Electricity Supply Memoranda" this week.

Providing for Larger Operations.

THE outlook of the gas industry has materially altered during the past twelve months; and perhaps, before the professional men of the industry assemble this month in London, it will not be unprofitable to touch briefly upon what is being done in the matter of preparation for the future. There has been a disposition to regard our developments in essentials as being practically complete. They can never be so, while changes are going on all around. What is essential one day may not suffice on the morrow; new developments, whether internal or external, create new essentials. In taking stock, we need not include any relatively short-lived matter such as the coal strike, although it has now extended its malefic influences over a longer period than any previous similar happening in this country, and its financial burdens and other incidences will be felt for many a long day. We have rather in mind those things which are of permanent importance. New considerations have arisen; new circumstances in position and in what is demanded of us have broken in upon our former method of dealing with affairs as they come along. The industry has become more creative, with an eye upon what is required for the development of its interests; and not a small part of what is being done is due to the action and scheme of the Government in connection with the electricity supply industry. In view of this, and of the competition which is rife in all departments of our trading, it is obvious that our present work lies in reinforcing our armaments by extending our methods, and by generally making ourselves more effective. These things are not done by a stroke of the pen. They need concentration of thought and study of detail, so that mistakes are avoided, right solutions given to our problems, and correct methods applied. All these things are necessary with an environment so much changed, and our having, as we have now, to drive forward against more active commercial rivalry. We may have our own views as to the improbability of the results of the Government electricity scheme being all that those responsible for its birth anticipate; but our opinions in that respect are not of capital importance. Supposing they should turn out to be wrong, and supposing the results expected by the Government and their advisers should materialize—the wise course is to set aside our own views as to the success or otherwise of the scheme, and to look upon it as something designed to place the electricity industry in a more effective state as business rivals. In other words, it is for the gas industry to proceed as though there was good possibility of all coming true as imagined by the originators of the scheme. Even if the Government object is not attained in respect of lower-priced electricity, it will be realized in regard to greater availability. It is therefore the business of the gas industry to get rid of its weaknesses, and to improve its strength for the change in trading position.

In the "JOURNAL" towards the end of last year and the beginning of this, we strongly counselled the formulation of a constructive policy by the industry in view of the outlook. It was urged by us that the time was particularly opportune for pressing forward with a scheme the con-

stituent parts of which should aid in the developing work of the industry, and in meeting the intensified competition to which there is no question it will be progressively exposed. An editorial article published in last week's issue shows this. The National Gas Council, sharing this opinion, have done an immense amount of work on this very question; and information has been given by the President of the Council (Mr. D. Milne Watson) as to the broad lines upon which they have determined to proceed through legislation. From what we know of the work that has been done, thoroughness is one of its features, and the advice and help of experts have been brought to bear upon its varied aspects. The Council have prepared a long list of improvements and modifications in the statutory powers of the industry which will enhance its strength, and enlarge its facilities and resources for work. The policy of grouping undertakings, or welding small concerns to large ones for the purpose of producing economies, is one which the Government have, in other spheres, adopted in the national interests. We have seen it in the case of railway companies; we have had it in water supply, by the formation of Water Boards, and the service of small communities by the larger undertakings, though under different local administration. The Government have made concentration of generation the centre round which their electricity policy has been built. Concentration of generation at, and transmission from, a comparatively few stations are the lines which permit, according to the scheme, the wiping-out of uneconomical and inefficient plants. All this is more ambitious than anything the gas industry has in view. In its opinion, the policy is a good one for gas if practised within reasonable territorial limits. The difference is only one of degree; but no Government which has adopted such a policy as is embodied in the electricity scheme can stand in the way of the gas industry doing likewise within the limits of the economic ability of those well-conditioned concerns which take the matter in hand—either by absorption or supply in bulk. We have existing some remarkable instances of what in this respect can be done to mutual advantage; and the subject is being largely studied by the responsible managements of many undertakings. In the legislative programme of the National Gas Council, this question is one of the chief items; and it will find a place among those matters of pressing importance which are to be brought, in the first place, to the notice of the Government of a draft Bill. In this, it is hoped, the Board of Trade (who have shown a great deal of sympathy over the initiative displayed by the gas industry) will be directly concerned. Other matters of minor importance will be left to be dealt with in the future when the question is taken in hand of overhauling the General Gas Acts—eliminating from them all that is now obsolete, and modernizing them so as to limit their provisions to current and prospective conditions.

Another important matter which is being seriously taken in hand by the National Gas Council, is that of the financial stability of the company-owned gas undertakings. It was thought that the Gas Regulation Act would have gone far to re-establish the high pre-war reputation the gas industry had among investors of capital. While the Act has done much to redeem the industry from the worst of its war experiences, market values show that it has not been wholly successful in replacing gas capital in its pre-war market position. This is detrimental to all concerned in the industry. The higher the market values in relation to the current conceptions of what dividends should be, the better for the industry and for the communities served by it. To all who have made a study of this matter, it is perfectly plain that the chief cause of lower market values for ordinary stock is the loss of confidence by investors in the operation of the sliding-scale. A bottomless sliding-scale has been proved to be an inherent defect in an otherwise valuable instrument for the mutual interest of both investor and consumer. To remedy this is another object of the legislative programme which the National Gas Council propose to press forward—by suggesting the insertion in the sliding-scale of a minimum dividend in the form in which it has been so successfully carried through Parliament by the Gas Light and Coke Company in respect of its own ordinary capital, following, of course, the precedent of the South Metropolitan and other gas companies in regard to basic prices and dividends, and of the Metropolitan Electricity Supply Companies, to whom a sliding-scale has been applied, accompanied by a minimum dividend. When general legislation in this respect is passed, it will, we are confident, have an excellent beneficial effect upon gas capital. There are some short-sighted individuals who consider that a minimum dividend should not apply to existing sliding-scale ordinary capital, but only to new capital. The unfairness of this is too obvious to need much argument. What would happen to those who provided the capital for carrying-on the gas industry up to the present stage would be that their holdings would be neglected and grossly depreciated in favour of all new capital carrying a minimum dividend. As to why they should be punished for the provision they made of capital in the past, although in the presence of a then undetected defect, only a very narrow mind could suggest a reason. There is another ground for eliminating the defect, and producing greater stability in the capital-raising powers of the industry. It is that the gas industry also requires a general raising throughout of the proportion of loan capital to ordinary, in view of the higher price which can be demanded for the security, and which will be of greater advantage, owing to probable developments requiring before long a considerable amount of new capital. The introduction of the minimum dividend into the sliding-scale will be an excellent set-off to the increase of the ratio of loan capital to ordinary, and, moreover, the holders of ordinary capital will have the satisfaction of knowing that enlargement of business is being obtained by capital which, owing to its precedence, commands good prices, and is satisfied with a lower rate of interest.

Another matter which, we believe, will take its place among the pressing measures desired by the gas industry is power to apply a two-part tariff as (for the present) an alternative to an ordinary one for the development of business. The case for the institution of this power has been presented time and again, and we will not on this occasion dilate upon it, but merely say that it is called for, not only by competition, but through the inequalities of the flat-rate system and the trend of business development in the gas industry in the heating line. For heating purposes, the consumption of gas is of a far larger order than obtained in the days when lighting was the only use of gas. To develop to common advantage the heating business, a low charge per unit of gas is necessary; and the way this can be realized, without duplicating piping and meters, is by a lump sum payment to cover overhead charges, with a secondary low price per therm for all gas consumed, whatever the purpose.

There are, of course, many matters which must not be overlooked, and which can be dealt with under existing powers, to bring about an improvement of position and strength—notably improved processes, appliances, and service. But we must look beyond to the big future for the industry—if only provision be made of suitable order. Although there are many matters with which the National Gas Council propose to deal when opportunity arrives, the main proposals which they are pressing forward show that vision, enterprise, and courage have combined to move them. If the same vision, enterprise, and courage spread throughout the industry, there need be little fear of intensified competition. By obtaining greater financial stability, the utmost economy and efficiency in our operations, and enlarging our service methods in such manner as will be both protective and promoting, gas undertakings will share well in the advance movement which is bound to take place following the restoration of industrial peace and normal conditions.

Gas Workers' Union and Foreign Coal.

It is understood that the Trade Union to which the greater number of gas workers belong are not in sympathy with those labour members of local councils who threaten that, if foreign coal is used for the purpose of maintaining the gas supply, the men at the gas-works will be called out. In the "JOURNAL" for Aug. 18 (p. 363), we discussed this matter from the point of view of the duty of those who are elected the representatives

of the community for local government purposes. The leaders of the Union who look after the interests of gas workers have no desire to see their members thrown out of employment; and they also know how dependent the families of members of trade unions generally are upon gas supply, through the slot meter system, for light and heat. They know too that it would be folly to do anything to prevent the maintenance of the supply of gas through the use of imported coal. Such use will not make the slightest difference one way or the other to the issue of the coal miners' strike, or to the inglorious mess into which Smith, Cook, and Co. have managed to engineer matters; but to stop such use would create a great deal of misery among people who have no concern in the coal muddle.

Capital-Holding Consumers.

A paragraph under this heading appears in our "Electricity Supply Memoranda" this week. It may prove suggestive to some administrators of gas company undertakings.

Fall in Company Promoters' Prices.

There appears to be some hesitation on the part of the public to subscribe the full amounts of capital required by the company promoters who used to operate from 43, Cannon Street, and now from various addresses. We see that the Electricity, Gas, Share Debenture, Investment and Guarantee Trust, Ltd. (the length of which title should alone give confidence to the public), who now carry on their activities from 121, Cheapside, E.C., are offering debentures and preference shares in the Southern Counties Electric Light and Power Supply, Ltd., at prices lower than those first sought. The last prospectus invited subscriptions for £10 first mortgage debentures, at £9 10s. each (or £95 p.ct.); £1 preference shares, at par; and 1s. ordinary shares, at 4s. per share, or 300 p.ct. premium! The kindly "Trust" will now be pleased to take £8 per debenture, and 18s. per £1 preference share, seeing that they have secured "upon favourable circumstances a small number." They will be "glad" to receive an "immediate reply." If a reply is made to the Trust, it should be: "Keep them."

The Unemployed Army.

The registers of the Employment Exchanges show that in Great Britain there were 1,580,500 persons unemployed on Aug. 16. This is 13,669 fewer than the week before; but 282,215 more than a year ago. The total of 1,580,500 is exclusive of persons who ceased work in the coal-mining industry on account of the dispute.

Coal Imports.

The Board of Trade Returns for July inform us that during that month 2,319,657 tons of coal were imported; the value being £4,147,995, or an average of 35s. 6d., c.i.f. Some additional particulars are given in our editorial article on the mining dispute.

Gas Oil Imports.

The quantity of gas oil imported in July was 13,634,286 gallons, as against 9,999,186 gallons in July, 1925. In the seven months of this year, 48,985,672 gallons were landed, compared with 42,827,348 gallons in the same period of 1925.

Loss of Coal Production.

During the week ended May 1, the output of the British mines was 5,097,700 tons. By the end of this week, the mines will have been on strike eighteen weeks. Supposing the pre-strike week's output had continued through that period, 91,758,600 tons would have been raised.

Coal Exports.

The Board of Trade Returns for July, so far as they refer to the coal and coke business, show a very ragged appearance. During the month 7381 tons of coal—mostly anthracite and steam—were shipped, compared with 4,442,256 tons in July, 1925, and 5,487,889 tons in July, 1924. The values were: July, 1926, £7708; July, 1925, £4,465,092; July, 1924, £6,363,621. During the month not an ounce of gas coal left the country. The effect upon the coal industry is perhaps better shown by the comparative figures for the seven months to the end of July. The shipments this year were 18,971,470 tons; for the same period of 1925, 30,290,699 tons; and for that of 1924, 36,618,946 tons. The respective values were £17,236,914, £31,377,428, and £44,366,613. In these last groups of figures, gas coal stood as follows: Seven months of 1926, 2,491,787 tons; 1925, 3,984,020 tons; 1924, 4,997,530 tons. The values were: 1926, £2,032,988; 1925, £3,907,015; 1924, £5,903,565

Gas Coke Shipments.

Gas coke exports naturally exhibited a big fall in July. Only 11,122 tons left these shores; the value being £11,444. In July, 1925, 46,695 tons were sold abroad, of a value of £44,194; while in July, 1924, 65,102 tons found customers abroad, the value being £110,724. In the seven months, however, we are still better off than in 1925, though not as good as in 1924. The quantity shipped in the seven months of this year was 380,440 tons; the value being £392,477. The amount sold abroad in the corresponding period of 1925 was 271,509 tons, of a value of £362,660; and in the same period of 1924, 507,819 tons, of a value of £887,459.

Tar Products Exports.

Only 272 gallons of benzole and toluole were shipped in July; but, in the seven months, the aggregate was 418,807 gallons, compared with 139,000 gallons in the corresponding period of last year. Naphtha also showed a diminution—3534 gallons, against 5159 gallons. In the seven months, however, 56,711 gallons were sent abroad, compared with 30,700 gallons. Tar, oil, creosote, &c., found custom abroad in July to the extent of 4,576,209 gallons, against 7,010,827 gallons in July, 1925. Despite this decline, 31,452,152 gallons were exported in the seven months, against 27,860,516 gallons in the same period of 1925.

Sulphate of Ammonia Shipments.

A better sulphate of ammonia export business was experienced in July than in June. The quantity shipped was 20,118 tons, compared with 22,023 tons in July, 1925. In the seven months, foreign sales totalled 123,201 tons, compared with 156,062 tons in the same period of 1925.

PERSONAL.

Mr. J. H. DONALDSON, Managing Director, Engineer, and Secretary of the Sevenoaks Gas Company, has been elected a Director of the Westerham Gas Company.

The marriage is to take place to-day, at the Parish Church, Bromley, Kent, of Mr. WILLIAM RONALD EDGAR, Managing-Director of Messrs. William Edgar & Son, Ltd., of Hammersmith, and only son of Mr. and Mrs. William Edgar, and Miss ETHEL SCREETON.

OBITUARY.

The death took place on Aug. 29, at his residence in Brantfell Road, Blackburn, of Major J. C. WYNNE, who was formerly Assistant Gas Engineer at Blackburn. He had never thoroughly recovered from his war experiences. When hostilities broke out he was an officer in the local Territorials, and went on active service with the East Lancashire Regiment; and he was badly wounded at Gallipoli. On returning home he was unable to resume his former profession.

It is with regret we have to announce that Mr. BENJAMIN BARK, the Works Manager of the Welsbach Gas Mantle Factory, passed away at 7.20 a.m. on Monday, Aug. 30. For the last year or more Mr. Bark had been in indifferent health; but it was thought that he was making strides towards a complete recovery, so that his untimely end came as a great shock to all who knew him. Mr. Bark had been in charge of the Welsbach factory for over 25 years, and was generally considered one of the greatest experts in the world on gas mantle manufacture. There was seldom a case pertaining to the industry in which his knowledge and advice were not sought; and his experience has in innumerable instances proved most valuable, not only to lighting authorities, but to public officials. Throughout the gas lighting industry the news of his death will be received with sorrow.

ELECTRICITY SUPPLY MEMORANDA.

THERE is indignation among the residents on the Woolwich Borough Council's estate at Eltham regarding the ban on gas for cooking purposes. The indignation is growing in volume; and there is a serious searching for means to cut the restriction which binds the tenants to electricity. The people are asking, Why tenancy of Council houses should take away from them the liberty which the tenants of other property enjoy, and compel them to be the slaves of electricity? What the Eltham householders feel on this matter is what the residents on other local authority estates have felt, and have rebelled against. The "Kentish Mercury" for Aug. 20 has an article on the subject. It states that many complaints have arisen in consequence of the forced restriction that electricity must be used for cooking purposes where coal ovens are not liked. "Repeatedly at Council meetings authority has been given to instal new kinds of coal-heated stoves to replace others that have proved unsatisfactory; and on all hands there has been a demand for gas-stoves, but it has been unheeded by the Council. Many residents have installed oil stoves; and there are regular services of itinerant oil vendors on the estate."

Eltham Revolt Against Electric Cookers.

The same article informs us that recently a petition was signed and presented to the Borough Council by upwards of 300 tenants, stating that experience has shown that "the electric stoves are both inefficient and expensive, and certainly beyond the limited financial resources of most tenants." The petitioners demand the same rights as are accorded to other ratepayers in the borough—the choice of using either electricity or gas. The Town Clerk has intimated that the Housing Committee have no intention of waiving the agreement, to which the tenants have replied that they intend to adopt other methods to obtain their freedom of choice. In other words, the Council are going to be autocratic, and try to keep the tenants to the condition as to electric stoves; but the latter are hoping to get relief from the compulsory use of something they do not want. As we have before pointed out, the Gas Acts compel gas undertakings to supply under certain conditions. The Woolwich Borough Council have not power to abrogate the right that Parliament has given to householders under those Acts. What Parliament did in the Newport (Mon.) case, in refusing to curb the liberty of occupiers of Corporation property, has been referred to on various occasions in the "JOURNAL." When local housing authorities want a joy-ride to see what other housing authorities are doing in the matter of electric cooking, perhaps they will now by-pass Eltham, in case they happen to meet the 300 signatories to the petition mentioned above.

A Big Petition.

We seem to recollect having seen the name of Shaw Desmond before; but we do not know anything as to his qualifications for writing upon the subject of "Can Electricity Save Britain?" except what he has put into an article published in the "Sunday Pictorial." From what he says in the effusion, the gentleman appears to think he is a prophet who should have honour in his own country; but, in our opinion, he is a scribbler of facts and suggestions without the knowledge to ascertain their relative importance as applied to our own country. He tells us in the article that it is not the place to deal with the technical and administrative considerations involved. The truth is he shows himself to be anything but competent for dealing with them; but like other writers of popular material, he dismisses the considerations by saying that they are "many and difficult, but in no wise insuperable." The first part of that sentence is the most sensible thing he says in the article; the second part, the certificate that he does not know what he is talking about. "Shaw Desmond" is one of those gentlemen who write as though all the electrical experts here are wrong, and he is the person who can put them right, and so is the saviour of the country. He may be a happy man in his conceit, but it will not lead him far.

The Popular Scribe

Mr. Desmond assures us that "if the Electricity Bill at present before Parliament become [an 's' at the end of 'become' would be better] law, England will have taken the first step towards her economic freedom. She will have realized for the first time that within ten years the whole concept of cheap power has changed; that coal in its present petty, wasteful form is as dead as the dodo, and that the only country which has a chance in the era of electrical competition is the electrified country." We do not know what he means. Perhaps he does not know himself. But dozens of high-placed experts in electricity supply are not in agreement with the prophet Desmond. That, however, is not all. "Within five years of national electrification not only coal but the dole will be as dead as the dodo." Poor dodo! "The taxpayer will be saved £100,000,000 a year; and like electrified Italy and electrified U.S.A. . . . British factories will be filled with the unemployed who, instead, now fill Britain's streets." The prospect may be exhilarating; but we are hoping the factories will be filled with employed, and not "unemployed." Our prophet compares incomparables, which is useless. It is frivolous and futile to compare this country with water-power countries—particularly with those where water power is plentiful, and coal scarce as a native product. In such countries he has found electricity being used in the poorest households. Quite likely. He also finds that electricity is a servant which never gives notice. That also is true; it never gives notice in this country when it is going to fail.

Who is a Prophet

"But how are we to get this great natural boon within the reach of the average household? How are we to get electricity at a cost based upon the cost of production under modern methods?" Listen, you great sleepy-headed electrical experts, for Shaw Desmond is now speaking. In the first place, it involves the harnessing by Great Britain of every ounce of "natural power" available from the flow of her rivers, and the rise and fall of her tides. We are wondering which rivers he is referring to. The Government are trying, without any great hope, to see whether anything in the way of electrical service can be accomplished profitably by the Severn. We are wondering what we are to do when the tides are not flowing, when they are on the ebb. Also what is to be done when the rivers are low through drought. Are we to build marvellous accumulators to store the electricity? If so we shall never get it cheaper than now; it would probably be vastly dearer—if it would hold out to satisfy requirements. If Shaw Desmond lives to see its consummation, he will probably find that the Shannon electricity scheme will be a fine non-paying venture for Ireland. We believe the Free State Government are beginning to have their doubts the farther they get involved in the financial obligations the scheme is imposing upon them. Then he suggests the regional linking-up of the existing electricity undertakings, which is a second-hand proposal. When all is done, he says—we hope our electrical friends will brace themselves up for this revelation—"we may yet see electricity supplied to the little householder at 4d. per unit, instead of the present 8d. which some of us pay." The "little householder" can already in most districts get as many electrical units (each capable of producing 3412 B.Th.U.!) as he requires for heating, cooking, and hot water supply at 1d. to (say) 2½d. per unit. We will not waste further time and space upon nonsense found in the article.

And a Visionary.

This is an idea which has never taken on much in this country, and, we believe, simply because there has not been enough perseverance in the matter. In the gas industry the auction clauses have inflicted a limitation upon the freedom of gas undertakings in issuing capital in a manner which will interest consumers. But, as was pointed out by Mr. William Cash, F.C.A., at the last meeting of the National Gas Council, liberty to do this can be obtained. He has been highly successful in two essays that he has made in this regard, in connection with gas companies of which he is Chairman. There can be no question that consumers who are also capital holders in a company are a good acquisition. Nevertheless, in our opinion, gas administrators have not thought sufficiently over the question; and, as a consequence, they have clung more or less religiously to the old methods of obtaining new capital. In America, the plan has gained a large hold among public utility companies; and they now vie in seeing who can make the best showing. We shall want a large amount of capital in the gas industry if things go as we anticipate they will—in the expansion of the industry in providing labour-saving and smokeless fuels. The electricity industry is also expecting that it will need a considerable amount of capital in future. We have not the slightest doubt that it will do so—if it has to carry out the scheme of the Government within the next few years. Whether or not it will be unprofitable expenditure, and a burden upon consumers, for many years to come, is a matter which at the moment does not concern us. Some of the millions required will be provided on a Government guarantee, and some on municipal credit; but, as the "Electrical Times" points out, much will have to be raised on the strength of the schemes themselves. It therefore advocates the thorough exploitation of a locality on behalf of the local electricity undertaking. It urges that every consumer or prospective consumer should be personally invited to take up bonds or preference stock or other form of investment in the electricity concern, and facilities for making small as well as large investments should be provided. We must not let electricity take complete possession of the local investment resources; the gas industry must be in the swim. We are reminded that in 1924 the customers and employees of public utility companies of the U.S.A. took up over £50,000,000 of securities.

Capital Holding Consumers.

THREE-PART GAS RATES.

By GEORGE EVETTS, M.Inst.C.E., M.Cons.E.

Under the above heading an article by the writer appeared in the "JOURNAL" for July 7, p. 27, in which the three-part rate recently introduced at Fort Collins, Northern Colorado, was investigated, and compared with British conditions. This article was the subject of an interesting letter from Mr. C. S. Reed, the Rate Consultant of the American Gas Association, which appeared in the "JOURNAL" for Aug. 11, p. 324. As gas engineers in England are becoming interested in this matter in increasing numbers, we are all indebted to Mr. Reed for the information which he has been good enough to supply.

It was assumed in the original article that the rate structure at Fort Collins was scientifically constructed. It is unlikely that any undertaking enterprising enough to introduce a three-part tariff would do so without an exhaustive investigation into the circumstances; and it was not suggested that the rate structure was inequitable under the ruling conditions. The object of the article was to show how such a tariff would work under British conditions.

Mr. Reed answers the most important point which was raised regarding the tariff—viz., that the lowness of the commodity charge is due to the supply of natural gas. We are informed that the gas-producing companies' rate varies from 4d. to 10d. per 1000 c.ft., with the result that the commodity charge of 1s. 8d. is fully explained.

THE CUSTOMER CHARGE.

With regard to the customer charge, Mr. Reed further gives us the interesting information that the average investment is round about £40 per customer in America, of which 50 p.ct. is for the distribution system, and that 8 p.ct. on the investment is not considered unreasonable for the American capital. The last-mentioned is significant; and with regard to the figure of £40 per customer, the writer can assure Mr. Reed that in furnishing a typical case of £22 per customer for Great Britain, a high figure was chosen rather than a low one.

Eliminating nominal additions due to conversion of capital, the actual capital employed in London and suburban undertakings would be substantially less than £20 per customer for works and storage, mains, services, meters, stoves, and prepayment installations.

Mr. Reed further states that the apparently high customer charge of 37s. 6d. is chiefly due to the inclusion in the Company's charge of a large portion of the "fixed charges on the distribution system of mains, meters, &c." Judging from his subsequent remarks, it would appear that this term "fixed charges" means the interest on the capital, as well as certain annual charges for repairs and maintenance. In this paragraph, we are brought into contact with one of the difficult problems associated with the formation of a rate structure.

Consider the item of annual interest or dividend on the capital employed for mains, services, and meters, which represents a substantial proportion of what is termed "profit" in this country. Should this be a customer charge or a demand charge, or a combination of both? If a combination, in what proportion?

There seems to be a good deal to be said for any allocation of costs, because the taking-on of a customer implies the laying of a main and the provision of a service and a meter; on the other hand, the demand per maximum hour for which the contract is made between supplier and customer is the ruling factor in settling the cost of the installation.

WEAKNESS OF THE FORT COLLINS SYSTEM.

Later in the same paragraph, Mr. Reed makes an admission of weakness of the system operating in this particular town, saying that he finds that, after deducting 32s. for dividend charges alone, he is left with only 5s. 6d. to cover all other customer charges, which he realizes is inadequate. He states that the balance "will not entirely cover the customer cost, but will leave the remainder to be taken care of by an increase in the commodity charge over and above the purchase or production cost of the gas." If this is the case, it would appear that the rate structure is unscientific in so far as it makes the commodity charge bear costs which are independent of the cost of production, or initial purchase in the case of natural gas supply.

The table of customers A and B given in his next paragraph is a complete justification for the inroduction of a two or a three part tariff in the typical gas undertaking chosen by the writer in the original article.

The writer is fully aware of the inequalities in the present system, and hopes that some satisfactory scheme will be evolved to satisfy the administrators of the gas undertakings, the shareholders, the consumers, the Government Departments, and the local authorities. With so many interests to serve and to satisfy, it is obvious that the initiation of the two or three part tariff system, as well as the actual calculation of the rates, will be a matter of a certain amount of time and considerable difficulty.

It is obvious that some of the American undertakings find difficulty in calculating with reasonable accuracy (or even logically) a method of dividing customer charges from demand charges.

COMBINATION OF CUSTOMER AND DEMAND CHARGES.

The introduction of a scale which combines the customer charge with the demand charge—*i.e.*, a minimum cost that carries with it a certain maximum hourly demand—seems a satisfactory method tending towards simplification.

The rate referred to in the report enclosed by Mr. Reed involves, as he says, a considerably higher charge when calculated on a flat-rate basis for small consumers. On the other hand, it is a higher charge altogether.

If this particular undertaking estimates that a demand of 50 c.ft. per hour is equal to $1 a month, then the initial 30 c.ft. would be equal to 60 c.; consequently, the $2 per month charge, which includes the first 30 c.ft. per hour, can be divided on the basis of $1.40 for the customer charge and 60 c. for the commodity charge. The Fort Collins rates and the one Mr. Reed mentions therefore compare as follows:

—	Customer.	Demand.	Commodity.
	Per Annum.	Per C.Ft. per Annum.	Per 1000 C.Ft.
Fort Collins (A)	$9	32 c.	40 c.
Reed's Enclosure (B) . .	$16·80	24 c.	100 c.
	Combined as service charge of $24 per annum for maximum demand up to 30 c.ft. per hour.		

The next table compares consumer No. 1 mentioned in the original article, taking 40,000 c.ft. per annum, at 30 c.ft. per hour maximum, and consumer No. 2 taking 100,000 c.ft. per annum at 80 c.ft. per hour maximum demand, and applying the two scales A and B in the above table:

—	Customer and Demand.	Commodity.	Total.	Average per 1000 C.Ft.
		£ s. d.	£ s. d.	s. d.
Customer No. 1 A .	£1 17s. 6d. + £2	3 6 8	7 4 2	3 7·2
,, B .	£5	8 6 8	13 6 8	6 8
Customer No. 2 A .	£1 17s. 6d. + £5 6s. 8d	8 6 8	15 10 10	3 1·3
,, B .	£7 10s.	20 16 8	28 6 8	5 8

From the latter table it appears that there is a substantial difference in the method of calculating the respective parts of the tariff when an increase of 50 c.ft. per hour maximum demand in Town A involves an increase of £3 16s. 8d. per annum—viz., nearly 100 p.ct.—whereas in Town B the same conditions involve an increase of £2 10s. per annum, or only 50 p.ct., taking in each case the customer and the demand charge combined. It is difficult to imagine that the mere difference of costs or conditions will account for this increase. There appears to be an inherent difference in allocation, seeing that the town in which the over-all cost is substantially cheaper requires 100 p.ct. increase in the combined customer and demand charge, compared with only 50 p.ct. for the other town.

This would appear to be further borne out by a consideration of the customer and the demand charges for the two towns. The customer charge in Town A is little more than half of Town B, whereas the demand charge is 33 p.ct. in excess. Taking these two charges together, and limiting the demand to 30 c.ft. an hour maximum, Fort Collins (Town A) makes a charge of $18.60 per annum where Town B. is $24 per annum.

POSITION OF SMALL CONSUMERS.

It is obvious, as Mr. Reed points out, that Rate B involves a much higher charge per 1000 c.ft. for small customers. The writer agrees that this fact does not alter the justice of the tariff rates, but the high *pro rata* costs for small consumers as applied to British conditions was included in the writer's original tables to show one of the difficulties which have to be faced before such a system can be introduced here.

The writer is in agreement with Mr. Reed that commercially it is unsound to retain the optional method, because it tends to keep-in the "non-paying" class—the very consumers the system is designed to eradicate—and its retention does not give a clear indication of the true value of the revised tariff.

DIFFICULTIES FACING ADOPTION IN THIS COUNTRY.

The suggested solution of a gradual introduction of the system with a transitional period was prompted by policy rather than economics or choice. Mr. Reed probably has little idea of the difficulties to be faced in this country when introducing a change of this description. There is a legislative tendency (with which none can quarrel) to protect the small consumer of any commodity, and many difficulties face the public utility undertaking wishing to modernize its methods of finance and

work on up-to-date commercial lines. These difficulties are not made easier by unreasonable opposition on the part of local authorities and others.

It must not be overlooked that there are many consumers who have been supplied with gas under the existing régime, but who would not be profitable according to any recognized system of cost allocation and who would not be accepted as new consumers with circumstances ruling to-day. The capital represented by this class is to a large extent incapable of transference, so that it would not be to the financial advantage of the gas undertaking to disconnect them. In other words, there are many of the non-profitable consumers who are better as customers than derelicts. At the same time, even on this basis of assessment, there is a class without which the undertaking would be better off, even after allowing for the dead capital created by their severance.

GRADUAL ELIMINATION OF NON-PROFITABLE CONSUMERS.

In the event of the introduction of a two or a three part tariff, all new consumers would be accepted under the new system only, and consequently the non-profitable consumer would be gradually eradicated. It would be extremely difficult in this country to force the hitherto unprofitable consumer under the new basis when it would entail doubling or even trebling his annual gas bill. The argument that he has for many years been purchasing under cost may appear logical, but it is very difficult to reconcile the change having regard to the mental outlook of the British consumer.

In view of all the difficulties accompanying the change-over, the writer is of the opinion that there must be a transition period in which the consumer will have the option of accepting the new basis or not.

The increase of consumption and the finding of new business in the domestic, as well as in the industrial, sphere which would follow the introduction of a two or a three part tariff would, to a large extent, compensate for the financial loss entailed; and in a short time the percentage of non-profitable consumers would be very small, and the effect on the price of gas negligible.

Finally, it has been found that even when the tariff has been introduced in an optional form, the percentage of non-profitable consumers has decreased, and the general prosperity of the undertaking (including the consumers) has shown a marked advance.

NEW TYPE COKE STOVE.

The "Minerva" Heater and Warm Air Circulator.

Long known to the gas industry in particular as makers of gas engines, and to engineers generally as the first firm to manufacture the Root patent tubular boiler, Messrs. William Grice & Sons, Ltd., of Fazeley Street, Birmingham, have now formulated a strong appeal to both, in the shape of a new type of coke or anthracite stove which has a wide field of usefulness for warming and drying, without invoking the aid of pipes, radiators, fans, or mechanical means. The "Minerva" heater and warm air circulator is a self-contained unit which is, in fact, designed to fulfil all modern requirements in respect to warming and ventilating almost any type of premises from bungalow to castle, and from garage to factory or warehouse; and it is also suitable for drying plants in connection with manufacturing processes which need them.

The "Minerva" Heater, Type A.

Briefly, the furnace may be described as a low-temperature gas producer, with effective means for the ignition and complete combustion of the gases in the chamber above the fuel bed. The furnace is constructed of heavy cast-iron plates, and its exterior is provided with thin radiating ribs projecting into the air heating chamber. Surrounding the furnace are two annular chambers. The inner one is effectively insulated, and the outer one is provided with the air intake. From this intake, the air is, by induced current, drawn into the heating compartment; and it is then expelled at a rapid rate of flow from the top of the heater. There is no possibility of the air being contaminated with the products of combustion. The air necessary for combustion is supplied through a separate louvre, which can be closed practically air-tight; and a damper is provided in a branch of the stackpipe, which can also be used for checking the draught through the fire.

The "Minerva" heater operates night and day, with the minimum of attention, and will last over a week-end, continuing to discharge warm air at not less than 100° Fahr. It can be installed without structural alterations. Access to the flue, or to the outside for a flue pipe, is all that is required. At slight extra cost, it is possible to draw a supply of fresh air from outside to the base of the heater by a conduit, and to discharge it as warm air in large volumes in the place it is intended to heat. As this air is always in motion, the simplest form of ventilating exits for the escape of the foul air is all that is necessary. Special means are provided (for use when desired) for humidifying or for disinfecting the air.

The following figures epitomize a series of rigorous tests, spread over a long period:

Type.	Cubic Feet Discharged per Hour at 250° Fahr.	Fuel Consumption in Lbs. per Hour at 250° Fahr.	Suitable for Heating Gross Cubic Feet.
A	10,000	2 lbs.	30,000
B	15,000	2½ ,,	45,000
C	25,000	4 ,,	100,000
D	50,000	7 ,,	200,000

A Domestic type, suitable for residences, office groups, clubs.
B Suitable for country houses, clubs, schools, churches, parish rooms, &c.
C Suitable for mansions, churches, town halls, cinemas, &c.
D Industrial type, suitable for warehouses, workshops, and any large buildings.

A hot water boiler and cistern can be adapted to the apparatus without serious change in design; and we understand that the heaters have been fitted for gas firing, in which form they are equally effective. The figures quoted show what the "Minerva" heater can accomplish; and the accompanying illustration indicates the neat appearance of this new ally.

Readers will have an opportunity of becoming more fully acquainted with the "Minerva" heater at the Smoke Abatement Exhibition in Birmingham.

FORTHCOMING ENGAGEMENTS.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

Sept. 6-18.—SMOKE ABATEMENT EXHIBITION, at Birmingham.
Sept. 9-10.—CERAMIC SOCIETY.—Meeting of the Refractory Materials Section, at Leeds.
Sept. 11.—GAS SALESMEN.—Annual meeting at Birmingham.
Sept. 14.—NATIONAL GAS COUNCIL.—Meeting.
Sept. 14-16.—INSTITUTION OF PUBLIC LIGHTING ENGINEERS.—Conference at Newcastle.
Sept. 15.—FEDERATION OF GAS EMPLOYERS.—Meeting.
Sept. 16.—MIDLAND ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Official visit to the Smoke Abatement Exhibition, Birmingham.
Sept. 20.—EVENING STAR LODGE.—Emergency Meeting.
Oct. 25, 26, 27.—BRITISH COMMERCIAL GAS ASSOCIATION.—Annual conference at Newcastle-upon-Tyne.
Feb. 16.—"B.C.G.A." MIDLAND DISTRICT CONFERENCE.

INSTITUTION OF GAS ENGINEERS.

Sept. 13.—Emergency and Finance Committees.
Sept. 14.—Advisory Committee on Education.
Sept. 20.—Council meeting.
Sept. 21-23.—Postponed Annual Meeting.
Sept. 24.—Visit to Hastings.

GAS INDUSTRY AND SMOKE ABATEMENT.

The Forthcoming Exhibition in Birmingham—Sept. 6 to Sept. 18.

As already mentioned in the "JOURNAL," an exhibition is to be held in Bingley Hall, Birmingham, from Sept. 6 to Sept. 18, under the auspices of the Smoke Abatement League of Great Britain.

We understand the policy of the League is not to concentrate on conferences or the collection of data of relative atmospheric impurities, but rather to bring to public notice methods of applying smokeless fuels. The average man has little interest in statistics; he lives in what appears to him to be a very practical world, or, at least, his horizon is bounded by practical problems. Although we are now realizing more fully that the result of purely scientific investigation does deeply influence our everyday life, yet it still remains true that a popular appeal must be a practical appeal. The League therefore strives to prove that its ideal of a smokeless city is an ideal that pays. We know that it is right in this contention; and the exhibits which will be staged at Bingley Hall augur well for the success of this practical policy. Smoke producers may be divided into two main classes—domestic and industrial. The League, from its experience in Manchester and the North, is inclined to add a further class—commercial offices. The exhibits have been arranged to appeal to all three classes.

The public is quite prepared to give smokeless fuel a fair trial, but usually applies two tests first—(1) cost and (2) convenience. The stress laid on each of these factors varies with different cases. In the vast majority of houses to-day, although convenience is desirable, economy is essential. With all factory users economy is, of course, of paramount importance. To users of all classes convenience has a certain money value, and it is necessary for them to strike a balance between laborious, old-fashioned methods with low fuel cost, and the more cleanly, labour-saving, up-to-date apparatus burning smokeless fuel, with possibly a slightly higher first cost for fuel. This being so, it is only natural that it is to the gas-works, with its two smokeless fuels—gas and coke—that the general public turns for assistance in cleansing the air it breathes.

CONFERENCE OF THE SMOKE ABATEMENT LEAGUE.

The conference of the Smoke Abatement League will bring to Birmingham many delegates from all parts of the country, interested in the steps that are being taken not only to reduce the emission of smoke from existing fires and furnaces, but also to ensure that with new factories, and with new houses and housing schemes, every effort is made to introduce economical and simple apparatus for smokeless combustion.

This conference is to take place from Sept. 7 to 10, in Bingley Hall. On Tuesday, the 7th inst., there is to be a paper on "Industry and Smoke Abatement," by A. Lindsay Forster. On Wednesday morning, E. D. Simon and Marion Fitzgerald will give a joint paper entitled "Housing and Smoke Abatement"—a subject which will be dealt with in the evening by Dr. Leonard Hill. On Thursday morning there will be papers on the "Smokeless Production of Heat and Power," by Dr. Margaret Fishenden and A. S. E. Ackermann; and during the afternoon visits will be made to the Birmingham Corporation Gas-Works and the Electricity Works. Friday is to be devoted to a visit to Stratford-upon-Avon.

MIDLAND UNDERTAKINGS AND THE EXHIBITION.

The gas industry in the Midlands and the apparatus makers have been quick to recognize the necessity of bringing before these visitors the different ways in which gas and coke can accomplish what they have in mind. The Gas Sub-Committee appointed to look after the interests of the industry at the exhibition has received subscriptions from the various Midland undertakings which have enabled it to erect and equip an excellent stand. It was thought best to leave the different manufacturers to display the many individual types of fires, cookers, &c., and to devote the space on this stand to demonstrations of the main types of apparatus and the manner in which they should be fixed.

One-half of the stand is laid out to show the various ways in which a supply of hot water may be obtained by the use of coke and gas heated appliances; and the staff will explain to inquirers how their particular circumstances and particular needs are best met by one or other of these types of apparatus. It is felt that, so long as the right type of appliance to be used is made clear, the pattern and make is of secondary importance, and is best left for individual decision.

The other side of the stand will show how gas fires, geysers, wash boilers, &c., should best be fitted. Great harm may be done to the industry by faulty fitting or inefficient flue outlets, and shoddy work in this direction may well prejudice the public against appliances which are in themselves really excellent in construction. It will be the duty of the staff, however, to point out to architects that these detached flues should not be necessary in the properly designed home. Gas apparatus should be accorded a proper flue, incorporated in the walls of the house, though of different dimensions from that needed for a coal fire. Where such a flue is not available, it is essential that the materials used for the detached flue should be permanent in character, so that the pipe will have a useful life, as long as the apparatus which it is designed to serve.

THE BIRMINGHAM GAS DEPARTMENT.

The Birmingham Gas Department has equipped a special stand to demonstrate the various ways in which coke may be utilized for domestic heating. Three main types will be shown actually under working conditions. An "Esse" slow combustion stove will be burning 1-in. breeze. An open "Bell" fire will prove that coke can be made to burn readily and economically in an open fire; while a "Bijou Eagle" combination range, burning small coke, will demonstrate that smokeless fuel will give a bright, cheerful kitchen fire and abundant supplies of hot water. Various types of independent household and greenhouse coke-heated boilers will also be exhibited.

So numerous are the industrial uses of gas that the Industrial Heating Section of the Birmingham Gas Department is, of course, only able to display typical furnaces for various metal melting and heat-treatment operations. This exhibit, together with that of Messrs. Spencer-Bonecourt, and the model boiler house fitted up in the lower annexe, will prove of very real help to any manufacturer who is anxious to modernize his plant and bring his various processes into line with present-day practice. Mention of Messrs. Spencer-Bonecourt's stand serves to remind one of the tremendous house heating load which the American gas industry is now taking up. Though our preference for the open fire precludes the adoption of central heating in many instances, there is still an enormous field for town gas for heating offices, public buildings, and the larger types of private house.

It is hoped in our next issue to give particulars of the individual stands of the various makers who will be represented at the exhibition.

The lecture by Sir Arthur Duckham, at 3.0 p.m. on Thursday, Sept. 16, on "The Contribution of the Gas Industry to Smoke Abatement," should prove of interest to the general public, and will be attended by the Midland Association of Gas Managers, who are making their official visit to the exhibition on that date.

Murdoch's House for Sale.—We learn from Messrs. A. Pearse Jenkin & Bowden, of Alma Place, Redruth, that they have for sale the house at Redruth in which William Murdoch lived from 1782 to 1798, and where he invented gas lighting and used it in 1792. As they remark, it would be a pity if this old cottage were allowed to become a ruin, and to be replaced and forgotten—more especially as an offer of £200 would probably satisfy the owner.

"Guide to Current Official Statistics."—This work appears annually. It is an expert survey of, and guide to, all the statistics published by the Government. It is not a mere catalogue of titles of official publications of statistical interest. Such a catalogue is, of course, included; but it forms only about one-third of the volume itself. The main portion of the work, and the one to which it owes its value and importance, consists of an alphabetical subject index which not only refers the inquirer to all the current official publications containing statistics bearing on his subject, but in addition indicates their nature and mode of analysis and the time and place to which they relate. The "Guide to Current Official Statistics" is published by H.M. Stationery Office, Adastral House, Kingsway, W.C. 2, price 1s. net, post free 1s. 3½d.

Scottish Junior Association (Eastern District) Visit to Perth.—The postponed visit to the Perth Gas-Works has now been arranged to take place on Saturday, Sept. 11. The Hon. Secretary and Treasurer (Mr. D. Yule) asks members to make a special effort to be present, as an excellent opportunity will be given to inspect the extensions carried out on these works, described in the Presidential Address of Mr. A. M'G. Clark. Members will meet at the works at 3 p.m.; and following the inspection they will be entertained at tea, on the invitation of the Perth Town Council.

Dr. John Bell Simpson, D.C.L., F.R.G.S., J.P., of Bradley Hall, Wylam-on-Tyne, who was on the Boards of a number of coal and other companies, and whose death occurred at the age of 88, left unsettled property of the gross value of £812,170, with net personalty £761,825.

Mr. W. J. Liberty, Public Lighting Superintendent of the City of London, has been invited by the Society of Engineers to give a paper on the "History of Artificial Lighting" at their first ordinary meeting of the next session, on Oct. 4, in the apartments of the Geological Society, Burlington House, Piccadilly.

SOCIÉTÉ TECHNIQUE.

Further Notes from the Annual Meeting.

A RADIANT-HEAT FURNACE.

M. Bazenant introduced his paper by observing that before the war town gas was not popular for industrial heating, as furnace construction was far from perfect, and in consequence processes were not easy to carry through. The war brought great developments, however, for engineers could work with some definite end in view without having to worry too much about the expense; and wide experience in the heat treatment of metals pointed the way to refinements in furnace design which have placed the employment of a high calorific value gas within the range of practical economics.

The subject of his contribution should, the author thinks, be of particular interest to gas men, as it is one of the "perfected" furnaces which offers them a new field for gas sales. Remarkable results from long experience in a variety of processes have been obtained from these furnaces—especially in Germany, where over a thousand installations are at work.

The patented design was invented and applied by Prof. Wollers, Chief of the Krupp Laboratories; and its chief characteristics are as follows:

1. The heating is entirely by radiation, without flame formation, and consequently without the disadvantages of flame contact with the contents.
2. The intimate admixture of gas and air (the latter heated in a recuperator) is effected in the early stages.

Easy to run and to regulate, the design permits the rapid attainment of high temperatures, and is particularly suited to the delicate treatment of all metals; there being no sign of oxidation or other undesired effects.

The essential parts of a radiant-heat furnace are the mixer, the distributor, the refractory brick, and the recuperator. Fig. 1

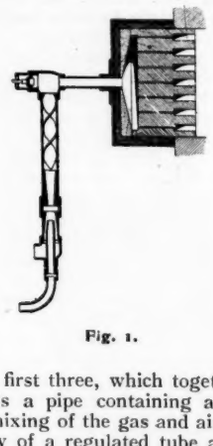


Fig. 1.

is a section of the first three, which together constitute a burner. The mixer is a pipe containing a baffled helix which insures thorough mixing of the gas and air; the latter arriving at a nozzle by way of a regulated tube and injecting the gas from a lateral supply pipe. Close control can be kept of the proportions of gas and air; the condition of the refractory bricks being the surest guide.

A light pressure is maintained in the furnace, so that cooling-off when the door is opened need not be feared. A poppet valve is fixed above the mixer, which gives security in the event of lighting back; but it is pointed out that this eventuality, owing to the speed of the mixture, is likely only in exceptional circumstances. The mixture is further improved by its passage through the distributor, whence it enters the burner proper. This is formed of a refractory brick of special shape and quality, traversed by numerous narrow channels which open out into wider passages or "cells," directed towards the interior of the furnace. The diameter and length of the channels and cells are determined by experiment so as to give complete combustion within them, whereby they are quickly raised to a high temperature. No flame should protrude into the furnace; the sole heat source being the radiant bricks of refractory material. One brick and refractory shapes behind it form the distributing box; and the whole is held together in a sheet-metal frame.

One injector tube may supply one or several bricks; and the shape and size of the latter depend on the particular treatment to be carried out. The recuperator is built-up of steel tubes; and therein the ingoing air is heated to 300°-400° C. by the products of combustion.

Fig. 2 shows diagrammatically one of these radiant-heat furnaces, in which complete combustion may be effected without excess of air. The temperature obtainable approaches the

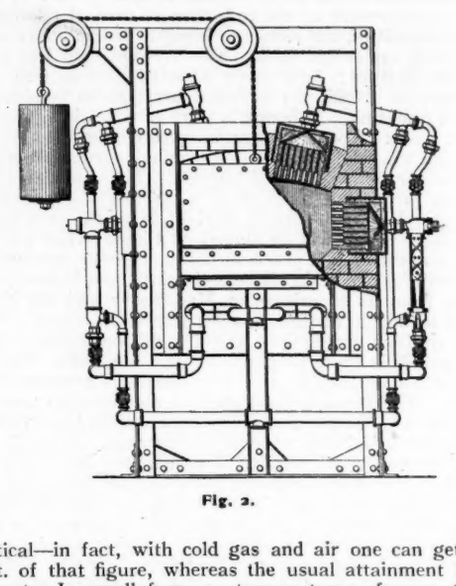


Fig. 2.

theoretical—in fact, with cold gas and air one can get up to 90 p.ct. of that figure, whereas the usual attainment is *circa* 60-70 p.ct. In small furnaces temperatures of over 1600° C. can be reached in a few minutes.

By careful location of the burners around the furnace, extreme evenness of temperature is possible; and there is a notable absence of hot spots, which can be so prejudicial in heat-treatment processes. Complete combustion being effected without excess air, the atmosphere in the furnace is not oxidizing; but a slight excess of gas will produce a reducing atmosphere. It is thus possible in most cases to do away altogether with a muffle.

The form of the burners permits their easy adaptation to all types of furnace, and their location—either on the side walls, on the arch, on the base, or at times all round—with any desired effect in view. In high-temperature furnaces for stampings, forgings, &c., the burner bricks are usually in the arch. For work requiring moderate temperatures, but great uniformity throughout the furnace—*e.g.*, hardening, soaking, re-heating, &c.—semi-muffle heating with the burners on the floor is preferred. Evenness of temperature and absence of oxidation are absolutely remarkable; and the whole range of processes can be carried out from high-temperature soaking of special steels (with preheating) down to routine work at 200° to 300° C. The author specially mentions installations for the blueing of steel parts in which an absolutely even colour is obtained; also plants for the re-heating of aluminium, &c., parts, which preserve their original polish throughout the process. In cases where heat treatment must be carried out in a protective atmosphere of gas, muffles must be used; and it has been found that in such instances the evenness of temperature assures a longer life for the muffle.

These radiant-heat furnaces work in general with compressed air at 150 gr. and gas either at normal town pressure or under pressure up to 150 gr. For temperatures up to 1200° to 1300° C. it is not necessary to compress the gas; with a pressure of 150 gr., 1600° C. can be attained.

In steel stamping furnaces with a hearth area of 1 sq. m., the hourly output has reached 420 kg. with a consumption of 52 cub.m. of 4200 cal. gas; the temperature being 1400° C. In an aluminium melting furnace (700° C.) starting from cold, the melting of 500 kg. took 1¾ hours with a consumption of 52 cub.m. of 4300 cal. gas. It is further pointed out that a high temperature is reached from cold in a very short time—*e.g.*, a furnace 1·2 m. by 1·3 m. reached 1300° C. in 1 hour with a consumption of 20 cub.m.

The paper includes various interesting photographs of furnaces, and concludes by pointing out that all industrial gases can be burnt in the radiant-heat plant, providing they are purified and of a calorific value of not less than 800 cal.

"The Gas Salesman" September Issue.

Owing to the date of publication of our Special Institution Number being Sept. 29, the next issue of "THE GAS SALESMAN" will be published on Sept. 22. This will contain a special report of the Annual Conference of the Gas Salesmen Circles in Birmingham, together with an account of their visit to the Universal Smoke Abatement Exhibition. In view of this earlier publication, any communications which readers desire to make to that particular issue should reach us not later than Friday, Sept. 17.

DETERIORATION OF COAL IN STORAGE.

Fines the Chief Cause of Danger.

In the July issue of "Fuel in Science and Practice," S. W. Parr has an interesting article on this subject. He says that it is now possible to predict the behaviour of coal under the various conditions met with in storage practice, and to prescribe the procedure to be followed.

Anthracite, he remarks, has a minimum capacity for oxygen absorption, and can be stored substantially in any quantity without deterioration or danger from spontaneous combustion. As for the storage of bituminous coal, it is of fundamental importance that the coal be substantially free from dust or duff—*i.e.*, material passing a ¼-in. screen. In the case of lump coal, an addition of fine material in masses too large to admit of carrying away the initial increments of heat by transpiration of air currents will invite local heating in the areas where the fine coal is located. Conversely, slack or screenings with occasional zones of nut or lump sizes where air may enter will heat first at the margins of the areas where the coarse coal occurs.

A storage mass of lump coal adjacent to a pile of slack will heat at the border line. The piling of screenings in a way to create channels for the free passage of air, as by coning, with the consequent rolling-down of nut sizes, will ensure heating at the margins of the chimney thus formed. Posts, girders, or braces may afford a ready access of air, and promote heating at such points. Indeed, it may be noted in this connection that screenings can be successfully stored if conditions are maintained which prevent the circulation of air. The opening-up of channels for a limited admission of air within the interior of such material must be avoided. In brief, there must be free circulation or no circulation at all. Every possible accession of extraneous heat must be avoided. Any interior temperature approximating 75° C. should be considered as having reached the danger line.

The height of piles is limited only by the increased tendency toward segregation of sizes with increase of height. Theoretically, with actual observance of the conditions of free air or no air, there is no limit to the height to which storage piles might be carried, but practically, with the added chance of violating those conditions, relatively shallow piles are safest. In case of doubt, use moderate heights—say, from 10 to 15 ft. There is the added advantage of dissipating the heat by conduction and radiation, as also the possibility of quick removal of hot spots for use under the boilers.

The author states that the question of coal types has little significance compared with the importance of maximum voids as secured by screened and sized lump, accessibility of air currents, and absence of extraneous heat. Any bituminous coal with normally good storing qualities may be stocked in a manner to ensure freedom from heating. As a matter of fact, the conflicting statements often met with concerning the storage qualities of the same coal, even of coal from the same mine, are evidence of the truth of these propositions.

Coal in storage which has acquired a temperature of (say) 75° C. will proceed to the point of ignition unless the conditions are altered. A continuance of that temperature for any considerable time—a few days at most—will result in a reduction of heating value, and in case of a coal to be used for carbonization, a weakened structure in the resulting coke.

Rating of Coals for Storage Purposes.

The fundamental factors involved suggest the propriety of assigning storage qualities on the basis of size rather than type. For example, the high moisture coals of the lignitic type would be set down as the most difficult or impossible to store without heating. The next in order of betterment would be the bituminous coals having from 12 to 15 p.ct. of moisture. The paramount factor in all bituminous coals, however, is fineness of division. This would include, of course, tendency to breakage and the production of fines in the process of shipping and handling. Those coals which disintegrate least on weathering are less ready to start active chemical reactions in the pile. Lump sizes free from duff may be safely stored. Coals of the low volatile type have a low water content and a greatly reduced avidity for oxygen; but these qualities, which should contribute directly to the storing properties of these coals, are frequently offset by structural peculiarities that contribute to the ease with which they disintegrate and develop fine material. However, it should be noted that, because of the greatly reduced absorption capacity of such coal for oxygen, the fines have nothing like the danger that attaches to fine material from the high moisture coals.

The author concludes his article by saying that, though initial reactions resulting in the development of heat may have their origin in the carbonaceous substance, independent of the presence or absence of sulphur, it must appear that this latter element constitutes an added feature requiring consideration. However, since the danger from sulphur largely centres in the duff, and since the avoidance of this material is essential also because of the ease of oxidation of the carbonaceous portion, an added argument appears for eliminating the fine material from the mass.

SELECTION OF COALS FOR THE MANUFACTURE OF COKE.

By H. J ROSE, Assistant Chief Chemist of the Koppers Company.

[From a paper read before the American Institute of Mining and Metallurgical Engineers.]

Coke Formation.

The typical cellular structure of coke is caused by the evolution of gas bubbles in a mass of fused coal which is stiffening through thermal decomposition. Non-coking coals do not fuse or become pasty under the influence of heat.

In the bye-product coke oven, the coal which comes into contact with the hot walls is rapidly carbonized, and a narrow pasty layer, called the "plastic zone," or "pitchy seam," is formed parallel to each heating wall. As carbonization proceeds, these layers move towards the centre of the oven at an average rate of about 0·5 to 0·65 in. per hour. The plastic zones consist of fused coal with tarry or pitchy material from coal that is being distilled. The thickness and nature of these zones depend on the kind of coal used, the degree of pulverization, rate of coking, &c. With good coking coals, especially when they have been well crushed or pulverized, there can be little doubt that the plastic zones are substantially impermeable to gases during most of the coking period. There is a sharp temperature gradient in the vicinity of these zones. Most of the gases and vapours are liberated on the hot side of the plastic zone and in the adjacent low-temperature coke, and are forced by their own pressure towards the oven walls, where they stream upwards, either along the walls or through shrinkage cracks in the coke. The rich gases are cracked to some extent by contact with hot surfaces, and they accordingly deposit on the coke a silvery carbon or hydrocarbon film, often referred to as a graphitic carbon deposit.

When the coking process is well under way, various solid products exist in the oven. Adjacent to the walls there is a layer of high-temperature coke which has already begun to shrink and fracture somewhat from the intense heat, and which is acquiring a silvery surface deposit. This high-temperature coke is continuous with, and grades imperceptibly into, lower and still lower temperature coke, until the plastic zone is reached. The plastic zone is usually ¾ to ½ in. thick, and on the hot side is cellular and emerges rather indistinctly into low-temperature coke. The cool side of the plastic zone, where the coal is just starting to fuse, is very sharply defined. Individual fragments of coal on the border line are seen to be fused at one end and little changed at the other end. The coal in the interior of the oven and shielded by the plastic zones remains unchanged and at a temperature little above that of boiling water for many hours, until it is finally reached by the slowly moving pasty layers. In actual practice, coking is usually continued not only until the plastic zones have met, but until the coke at the centre of the oven has attained a red heat. A division line is present where the two plastic zones have come together, and the coke mass breaks apart along this plane, so that individual coke pieces are but half as long as the oven width.

Definition of Coking Coal.

The commercial value of coke depends upon its purity, and upon such factors as size, strength, and structure. These physical characteristics are determined not only by the kind of coal used, but also by the degree of pulverization and the moisture content of the coal, the amount, nature, and size of impurities such as slate, the temperature of the oven walls, the dimensions of the oven, and other variables, all of which affect the coke at some stage of its formation. Therefore, it is not surprising to find that the only thoroughly reliable way to determine the quality of coke that can be made from a coal under particular conditions is to subject the coal to a full-scale test under the desired conditions.

For practical purposes, a coal may be classed as a coking coal if it will yield a merchantable coke when carbonized by a commercial method.

Determination of the Coking Properties of Coal.

The problem of determining the coking quality of coal by test methods has received an amount of attention warranted by the great industrial importance of coke.

The simplest of all coking tests is no doubt the standard volatile matter determination in which a gramme of powdered coal is suddenly heated to redness in a small platinum crucible. The resulting coke button will indicate whether the coal is non-coking, feebly coking, or strongly coking; but almost every condition in this test is at variance with large-scale carbonizing practice.

Classification of Coal by Volatile Matter Content.

The terms low, medium, and high volatile coking coals, gas coals, and high-oxygen coking coals do not designate sharply-defined classes. These and similar terms are used by bye-product coke oven operators in a relative sense; and the exact meanings intended by the individual operator may vary somewhat with the nature of the coals with which he is best acquainted, or which are available for his plant.

Low-Volatile Coking Coal.—In the north-eastern quarter of the United States (where more than 80 p.ct. of the bye-product coke is produced), the term " low-volatile coal " is used chiefly to designate coals of less than 20 p.ct. volatile matter. For bye-product oven use, such coals are mixed with high-volatile coking or gas coals in any proportion up to 60 p.ct. or more (but usually from 10 p.ct. to 30 p.ct.), in order to increase the size and strength of the coke.

Most bye-product oven operators, in selecting low-volatile coals, prefer coals having a volatile matter content of about 16 to 18 p.ct. (dry-coal basis), although a considerable quantity of coal that does not come within this range is used. True low-volatile coals are not charged in an unmixed condition into bye-product coke ovens, because of their expanding properties when coked.

Medium-Volatile Coking Coal.—There appear to be no well-defined, accepted limits for medium-volatile coking coals; and usage of this term is known to vary. The writer's personal preference is to include in this class those coals ranging from about 22 to 28 p.ct. volatile matter, dry basis. The medium-volatile coals, when coked without admixture, nearly always produce a large, handsome, blocky coke which is difficult to surpass in general physical characteristics. If coking such coal in an unmixed condition in a bye-product oven is desired, very careful and thorough tests are required to determine the conditions under which it may be satisfactorily used; and both quality of the coal and plant operating conditions must be carefully watched to prevent possible trouble.

High-Volatile Coking Coal.—Enormous quantities of coal ranging from 28 to 35 p.ct. volatile matter, dry basis, are used in bye-product coke ovens. Some of the largest plants coke such coal in an unmixed condition; many others use mixtures in which such coals are the principal components.

Recent improvements in coke oven design have greatly increased the coking possibilities of straight high-volatile coals.

Gas Coal.—Gas coals may be defined as high-volatile coking coals suitable for the manufacture of city gas. The term was formerly restricted to those coals that had proved satisfactory for use in coal gas retorts, but this distinction is losing its importance, because of the very extensive use of coke oven gas for city supply. More than half of the total coal gas distributed through city mains in the United States is now obtained from bye-product coke ovens, and the proportion is rapidly increasing.

Gas coals are characterized by a high yield of B.Th.U. in gas per ton of coal, and they have a volatile content ranging from about 33 to 38 p.ct., dry basis. When carbonized in bye-product ovens, they may be used alone, or with an admixture of low-volatile coal to improve coke quality. Most large gas companies require that gas coals for their use shall contain less than 1·25 p.ct. of sulphur; and a large amount of gas coal used in America has a sulphur content well under 1 p.ct.

High-Oxygen Coking Coal.—Last to claim our attention are the high-oxygen coking coals, which contain about 8 to 11 p.ct. of oxygen in the pure coal substance, and about 32 to 42 p.ct. of volatile matter, dry basis. When such coals are carbonized, they tend to give a smaller, weaker, and more fingery coke than any of the coals previously considered. Many of them give, under some conditions, a more or less pebbly, friable product which cannot be termed good coke, and which has little commercial value. High-oxygen coals require a distinctly greater amount of heat for carbonization than other coals, and a high coking temperature is required for best results. For these reasons both a higher coking temperature and a slightly longer coking time are usually employed for carbonizing such coals.

The coking properties of all coals are adversely affected by weathering (oxidation), and it is particularly essential that high-oxygen coals be carbonized in a freshly-mined condition, to obtain best results.

Volatile Matter and Calorific Value for Coal Classification.

Volatile matter alone is not a safe criterion for classifying coking coals, as the volatile matter limits of high-oxygen coking coal, gas coal, and high-volatile coking coal overlap considerably. This may be explained by the fact that, although hydrogen and oxygen are both responsible for the formation of volatile matter, they act very differently in affecting the quality of coke and bye-products obtained. Thus a gas coal of 34 p.ct. volatile matter may have excellent coking properties and give a high yield of rich gas, whereas a high-oxygen coal also having 34 p.ct. volatile matter may give a very poor coke under many conditions, and yield a gas of rather low heating value.

When coking coals are classified by means of their percentages of volatile matter, it is highly desirable to determine either their oxygen content or their calorific value. It has long been known that the calorific value of a coal closely depends upon its ultimate analysis. Though we are primarily interested in the oxygen content of a coking coal, the calorific value is often more accurately determined than the oxygen figure, and, moreover, it is frequently variable when the latter figure has not been obtained. Parr has proposed a classification of coals based upon the volatile matter and calorific value of pure or " unit " coal.

Coal Classes and Coke Structure.

The following generalizations will prove useful, though they are subject to many exceptions due to the effect of independent variables.

Small-Celled Coke.—Low-volatile coals when coked alone give large, tough, blocky coke pieces which are vastly different in general appearance from the usually slender or fingery, more or less curved, and somewhat soft and brittle coke commonly obtained from coking coals highest in oxygen. Yet the cell structures of these cokes have certain common properties. Both are characterized by small cells with thin cell walls. The small size of the cells gives to these cokes a fine-grained appearance which sometimes leads to their being called dense. However, coke from low-volatile coal is of medium apparent specific gravity, whereas the coke from high-oxygen coking coals will be found to have a very low apparent specific gravity; in fact, it is the lightest in weight of all cokes.

The cell structure of the low-volatile coke is often extremely uniform, whereas the high-oxygen coals frequently produce a coke containing large cells irregularly distributed, and areas of cells with thicker walls. Both types of coal commonly contain more or less semi-coking or non-coking material (other than slate).

Certain high-volatile coking coals tend to produce a small-celled coke with very thick walls, which is the hardest and densest of all types of coke. Because of the large amount of shrinkage involved in the formation of a dense product from high-volatile coal, such coke is characterized by many longitudinal shrinkage cracks. If the coke pieces are large when formed, they will usually be found to consist of bundles of slender pieces which tend to break apart upon handling. The formation of coke of this type is not limited to coals having any particular ultimate analysis. Coals with a volatile content ranging from at least 28 to 37 p.ct. may exhibit this behaviour. The cause of the very dense structure appears to lie in the existence of certain physical conditions during the coking process.

Most of these coals respond very favourably to the addition of low-volatile coal, and the mixture will usually give a much more open cell structure and larger, stronger coke pieces. The addition of enough low-volatile coal may largely or entirely prevent formation of longitudinal shrinkage cracks.

Large-Celled Coke.—Medium-volatile coking coals characteristically produce a strong, blocky, silvery grey coke of strikingly uniform and handsome appearance. The cells of those cokes from coals approaching the low-volatile class are apt to be small and thin-walled, whereas those from coals approaching the high-volatile group, though apt to be small, are likely to have rather heavy cell walls. However, many medium-volatile coals, particularly those with about 26 p.ct. of volatiles, give a coke with very large cells of uniform size and with profusely porous cell walls. Such coke exhibits few cross fractures; but, when broken, the fractured surface is smooth and at right angles to the length of the coke piece. The fractured surface facing toward the oven wall is noticeably brighter in appearance than the other side of the fracture. The flattened shape of the cells causes an almost flaky appearance.

Other coals, particularly those with a volatile content around 34 p.ct., have also been observed to give coke with large uniform cells and porous cell walls, but the flaky silvery appearance of the fractured surface is lacking.

Coke with Cells of Medium or Irregular Size.—Coals producing coke with cells of medium size may be considered as intermediate between certain of the coals mentioned above. Mixtures of dissimilar coals usually produce coke of this type.

Gas coals rather high in oxygen tend to produce coke with cells that average large but are irregular in size, wall thickness, and general appearance. The individual constituents of banded coal usually possess different coking properties, and thus give rise to an irregular cell structure.

Low and high volatile coals differ considerably in fusing temperature and physical behaviour when heated. When such coals are to be coked together, a good degree of pulverization and thorough mixing is necessary to get the full value of the low-volatile material which is added.

The Range of Cokeable Coals.—The most interesting and important fact brought out by the preceding discussion of coking coals is that a very wide range of coal types is now available for the manufacture of bye-product coke. Recent important advances in coke-oven design have greatly simplified the problem of coal selection.

PROBLEMS FOR GAS CHEMISTS.

[From the Report of the Works Chemists' Commission of the German Gas Association, "Das Gas- und Wasserfach," June 5, 1926.]

The Commission held, in the course of the year under report, a joint sitting with the German Chemists' Association; and several of the subjects debated are worthy of record.

On the subject of coal analyses and laboratory tests for gas-making and calorific value, tar, and ammonia, it was observed that several methods in general use give results which agree reasonably with one another, but do not accord by any means with subsequent findings obtained in working practice; and no one has yet discovered a formula whereby the results can be correlated. Knublauch, it is true, has made some interesting observations from experience with coke oven practice, but in gas-works the carbonization system, duration of charge, and other factors influencing the superheating of products in the retort, are so essentially variable. One suggestion made was that coal for analysis should be introduced direct into the apparatus when the latter has already been raised to a high temperature, and that superheating of the tar should be effected in the electrical laboratory furnace to a degree which could be exactly repeated in all analyses. Prof. Strache made the suggestion that two extreme values should be recorded, one obtained by carefully sparing the tar by means of low-temperature working, and the other by obtaining the maximum possible calorific value in gaseous form by working at high temperatures. This value could then be regarded as the gross calorific figure for the coal, and the product of the volume and calorific value obtained under normal working conditions expressed as a percentage of it.

With reference to crucible coking tests, it was stated that, no matter what material was used for the crucible, results agreeing among themselves, and with those given by the plain platinum crucible, were obtained provided that radiation conditions were taken into account, and temperatures in the coking mass maintained constant.

Improvement of Coke.

Good results in this direction have been obtained by the addition of suitable small coal before carbonization. Several works have reported that, even without the help of grinding and mixing plant, they have been able to reduce by half the quantity of small coke below 12 mm. [about ½ in.]. At one works they have obtained about 86 p.ct. large and 10 p.ct. nuts, and the somewhat higher ash due to the admixture of coal duff is counterbalanced by the better size of the coke. No resulting pressure difficulties have been reported in the case either of vertical retorts or of vertical and inclined chambers, though in one instance, for the first 10 to 20 minutes of the charge, an increased pressure of 25 mm. [about 1 in.] at the lower end of the retort was observed. A reduction of the moisture contents in the coke has, in several cases, proved very valuable in competing with patent oven brands.

Spent Oxide.

Investigations during the year have proved interesting, and some of the results were summarized. Spent oxide contains sulphur in sulphite form in varying quantity up to 3 p.ct., which, when testing by the calcining process, is released with the rest. The extraction methods of Knublauch and Soxhlet, it is found, give results which vary according to the quantity of tar in the material, though for uncombined sulphur they agree. The Offermann-Fleischer method is unreliable for material with high tar content. In the combustion process, it is suggested that certain modifications, which have been worked out by the Commission, be made in connection with the test method of Hempel-Pfeiffer. The spent material should be burned in a tube in an oxygen stream, the combustion gases absorbed in hydrogen superoxide and caustic potash, and the resultant sulphuric acid titrated. In this way the sulphite sulphur is also accounted for.

Benzole Extraction.

In connection with the thickening of benzole wash-oil, Dr. Bunte reported on an experiment conducted in conjunction with an assistant, which showed that neither sulphuretted hydrogen, nor ammonia, nor cyanogen, either separately or present all together, even in the presence of iron and under the influence of direct steaming, had given rise to any thickening of the wash-oil. The addition, however, of elemental sulphur, or sulphur in polysulphide form, does give rise readily to considerable thickening of the same nature as that which is so often observed in practice. Dr. Bunte has as yet not been able to adduce satisfactory proof as to whether the formation of polysulphides in the presence of ammonia, sulphuretted hydrogen, and oxygen in the gas is the sole or predominating cause of the thickening in the wash-oil.

A recommendation was agreed that the wash-oil should conform to a limit of 1 p.ct. of water content, and that fractions up to 230° C. should not exceed 10 p.ct., or 90 p.ct. up to 300° C.

Good results were reported from several quarters from the use of paraffin oils for benzole extraction, and tetralene has also been successfully employed. Zurich has tried petroleum oils with a low-temperature process, and has had good results.

CONVERSION OF CARBON MONOXIDE AND HYDROGEN INTO SYNTHETIC FUELS.

By Dr. R. T. Elworthy, of Ottawa.

[From a Paper presented to the Canadian Gas Association.]

Synthetic Methanol and Synthol.

The chemical equation representing the formation of methanol from carbon monoxide and hydrogen is: $CO + 2H_2 = CH_3OH$.

Briefly outlined, the process consists in circulating water gas enriched with hydrogen at a pressure of about 150 atmospheres over a catalyst maintained at about 400° C. Methanol and other organic liquids formed are separated by condensation from the cooled reaction gases. About 8 or 10 p.ct. conversion is obtained in one passage through the autoclave or reaction bomb. The uncombined gases *plus* make-up gases are then re-circulated. There is great similarity between this process and the Haber synthetic ammonia process, particularly in the type of plant required, though the methanol process is believed to be much simpler and cheaper in operation.

In the Badische process well purified gases are required; and it is claimed that only methanol is produced.

Patart states that other alcohols and organic compounds are formed in addition to the major yield of methanol, depending largely on the catalyst used. Oxides of zinc, chromium, copper, vanadium, manganese, uranium, lead, and other similar metals, have been specified as suitable catalysts. There has been much controversy over the question of priority of patents.

No reliable figures are available of the costs of production in Germany. Patart, in France, claims from the results of semi-commercial plant work that 150 cub.m. of water gas and 64 cub.m. of hydrogen yield 1 hectolitre (22 gallons) of synthetic methanol. These figures converted to British units correspond to a yield of a little over 4 gallons of methanol from 1000 c.ft. of water gas and 425 c.ft. of hydrogen. This quantity of hydrogen prepared by the Bosch process (in which water gas and steam are passed over heated iron, with the conversion of the carbon monoxide to carbon dioxide and its subsequent removal by solution in water or cuprous ammonium formate solution under pressure) requires approximately an additional 1000 c.ft. of water gas. In round numbers, 10,000 c.ft. of water gas will yield about 20 gallons of methanol. Patart gives the cost of the water gas used as 9 c. per 1000 c.ft., and of hydrogen 14·1 c. per 1000 c.ft. Altogether, with material costs and overhead and manufacturing charges, he gives a cost in factory vats equivalent to 9·5 c. per gallon. It is, of course, probable that these costs would be considerably greater in Canada.

Mr. R. E. Gilmour, in a recent paper on "Gasoline and Substitute Motor Fuels in Canada," read before the Canadian Chemical Convention in Montreal in June, making certain assumptions, calculates that synthetic methanol would cost at least 40 c. per gallon manufactured in Canada. Methanol is not a very suitable substitute for gasoline, particularly as it requires 1·5 to 1·6 gallons of this liquid to be the fuel equivalent of one gallon of gasoline.

Franz Fischer, Director of the Kaiser Wilhelm Institute for Coal Research, has shown that, by using a catalyst prepared from iron and in alkali, a mixture termed "synthol," containing a larger proportion of higher hydrocarbon compounds and having a higher calorific value, can be produced from water gas and hydrogen under conditions somewhat similar to those used in the methanol process.

Other Uses of Methanol and the Higher Alcohol.

Methanol, butanol, and other industrial organic chemicals which these new processes may produce, have wide applications in chemical industry. They are used as solvents in var-

nish and paint making, particularly for cellulose lacquers like Duco, which are attaining such importance, and in the widely expanding artificial silk industry. Large quantities of methanol are used in denaturing ethyl alcohol and for the manufacture of formaldehyde. Industrial uses of such solvents will develop rapidly as the supply becomes greater.

GASOLINE SUBSTITUTES FROM COKE OVEN GAS.

Benzole is a widely used motor fuel in Europe. In the United States in 1924, benzole formed almost 1 p.ct. of the total motor spirit consumed. In France, a law has recently been passed enforcing the recovery of benzole in all gas-making plants.

Much work is being done in England by the National Benzole Association, and in Germany by private and government organizations, on more efficient and cheaper methods of benzole recovery. Solid absorbents such as activated charcoal and silica gel are being tried out, as well as new liquid absorbents such as tetralin and cresols, as in the Bregeat process. Another most interesting development, in France, is the recovery of the ethylene, present in coke oven gas to the extent of 2 or 3 p.ct., by a liquefaction process, and its subsequent conversion into ethyl alcohol.

There are also possibilities of separating certain constituents of coke oven gas so as to obtain suitable gaseous mixtures for the synthetic alcohol processes, but much laboratory research, and particularly semi-commercial scale investigations, must be carried out before they can be adopted on a large scale by the gas industry.

FUTURE DEVELOPMENTS.

It is certain that either the petroleum industry or the gas industry must take up the development of these new processes. The gas industry has many initial advantages. The gas making and purifying plant may be considered installed. Compressors, capable of compressing gases from 200 to 1000 atmospheres are now being made in Europe by the leading makers. It may not be long before the gas industry is much more commonly distributing gas under high pressure. Storage under pressure is coming in, and large compressors for distribution may be required. The catalyst bombs and the necessary condensers and washing towers would give rise to few problems for gas engineers.

The following paragraphs from Dr. Fieldner's paper excellently summarize the situation:

> The summer months, when the need for motor fuel is greatest, is the period when gas plants have much idle capacity which must be maintained to carry the peak loads of the winter season. The addition of synthetic motor fuel units would serve to give an even load and would at the same time permit the unhampered development of domestic house heating, which at present is increasing the top-heavy winter loads.
>
> The gas utility companies also have natural advantages in selecting the most economic process for providing the necessary constituent gases and in disposing of residual gases from the process. For example, in making methanol, they can manufacture in bye-product ovens the coke for making the water gas, separate the requisite extra volume of hydrogen from the coke oven gas, and use the remaining rich-in-methane gas for enriching water gas for city distribution. Such enrichment will be needed to take the place of the present-day oil carburetting. The ethylene can also be converted to ethyl alcohol which, with the benzole from the coke ovens, can be mixed with the methanol for motor fuel.

NOTES ON PURIFICATION.

By H. BLAKELEY.

[A Paper read before the Irish Association of Gas Managers.]

In fixing on the subject of my paper, I am not suggesting that I have the necessary qualification to add considerably to the present knowledge of the chemistry of the subject, nor do I think I can say anything really new in respect of present-day purification systems; but I may be able to present a few fresh aspects of various matters relative thereto—particularly from the plant manufacturer's viewpoint—which may possibly be of assistance to many who are present. I therefore ask your indulgence if I attempt to bring to the front one or two phases of the purification side of gas production which I think may be helpful in the direction of improved methods in this sphere of gas-works practice.

At the purifier inlet the gas contains sulphuretted hydrogen, other sulphur compounds, carbon dioxide, hydrocyanic acid, and, usually, a small percentage of ammonia. Of these impurities, sulphuretted hydrogen should be completely removed, to conform with legal requirements; and it is with the removal of this sulphur content that we are primarily concerned at present. In this connection one may truly say that the practice to-day is, to all intents and purposes, the same as has obtained through the greater part of the whole gas era. Carbon dioxide, though present usually in a fairly large degree, cannot exactly be classed as an impurity; rather is it a diluent. As to the ammonia, what usually remains at this point has a tendency to increase still further the efficiency of the oxide, by keeping it alkaline.

I have in my possession an old catalogue of the late George Bower, of St. Neots, who might correctly be described as the universal provider of gas-works about the middle of last century. A comparison of the gas plant in those far-off days with present-day practice is a source of considerable interest and enlightenment. Plants are there shown where the gas, after leaving the condenser, passes into a box which acts as washer, scrubber, and purifier combined. Purifiers in those days were often made in circular form, and lime was the sole purifying agent. Also, be it noted, it was always the custom to place the inlets and outlets of the purifiers in the bottom. Why, it is hard to see, for, being so placed, the connections were always an expensive matter, and the foundations more costly, on account of the pier walls which it was necessary to build to support the purifiers and enable the pipes to be fixed beneath the structure. At the present day a simple bed of concrete, from 6 to 12 in. thick, is all that is required for purifiers which are to be fixed at ground level; and the inlets and outlets being provided at the sides, the gas is directed under the bottom tier by a suitable inlet box similar to, but smaller than, the outlet box.

In many gas-works to-day ground space is a great factor when the need arises for increased purifying plant. Where the works are situated in a congested area, and the works themselves are already cramped for working space, and when surrounding property is valuable, it is frequently found desirable and more economical to erect the new installation overhead; the space beneath being utilized for oxide revivification purposes. The cost of such an installation to the small works is usually found to be prohibitive; and unless such works are more or less hemmed-in by other buildings, it is generally cheaper in such cases to procure a little extra ground space for such increase of purifying capacity, and to erect the purifiers at ground level. In addition, one must look at the increased labour costs in renewal of purifying material to overhead purifiers, or, alternatively, the added cost of elevating plant, which would be too heavy for the smaller works to bear.

The purification material most commonly used at present is ferric oxide (Fe_2O_3); and whereas in Ireland this is obtained more cheaply in the form of bog ore or natural oxide of iron, it is more largely used than on the other side of the channel, where it is customary to employ artificial preparations, which in most cases have, I believe, proved more active agents in combining with sulphur compounds.

As for the quantity of oxide requisite for effective purification of gas, a fair average calculation would be (say) 1 c.ft. of oxide to 160 to 200 c.ft. of gas per day (that is, for the average gas consumption and not the maximum).

The next consideration is that the oxide should be spread over such an area that the depth of each layer of oxide in the purifiers should not exceed 30 in. For the ordinary flat form of grid, it is usual to provide two distinct layers of oxide in each purifier.

In the past, especially in connection with lime purification, it was usual to have three, four, or even more layers of material, but now many engineers have only one deep layer of oxide—particularly so when hurdle grids are used. Opinions differ somewhat on the efficiency of hurdle and flat grids, many still preferring the flat type; but this may probably be on account of the more fragile construction of the hurdle, and perhaps also because in their use it is essential that the oxide be in the best condition and of even body, so that the gas passes through it uniformly over the whole area of the boxes.

When only one layer of material is used, it is the custom to arrange for the gas to go through the purifiers in a downward direction. This is a wise procedure, for, in the event of back-pressure necessitating the cutting-off of any particular box, it will often be found that, by lifting the cover and raking over the top surface of the oxide, a further period of useful service can be obtained without changing the purifier.

The gas engineer, when contemplating the installation of new purifying plant, has many factors to take into account—viz., the capacity of the plant, with provision for likely future requirements, and the ground space available. The cost of the new installation has partly to be balanced by the saving in labour charges, though it is generally recognized that in installing new purifiers the cost can seldom be entirely recouped by this saving.

There are many formulæ for the calculation of the size or capacity of purifiers, but the well-known rule of allowing a fifteen minute contact of the gas in the purifiers—viz., from the time of entering the first purifier until leaving the last—is one that can well be depended upon. Thus, two 12 ft. square purifiers 5 ft. in depth would be about the size to deal efficiently and economically with 5760 c.ft. per hour.

Modern purifiers, in the majority of cases, are made in multiples of 4 ft., 5 ft., and 6 ft. plates. I have tabulated below a list of sizes in sets of 2, 3, and 4, with their capacity given for the fifteen minute contact above-mentioned, and in the sizes which are most common. The capacities stated are when all are at work.

Size of each Purifier.	Capacity per Hour in C.Ft.		
	In Sets of Two.	In Sets of Three.	In Sets of Four.
6 ft. by 6 ft. by 4 ft. deep	1,150	1,725	2,300
8 ,, 6 ,, 4 ,,	1,535	2,300	3,070
8 ,, 8 ,, 4 ft. 6 in. deep	2,300	3,450	4,600
10 ,, 8 ,, 4 ,, 6 ,,	2,880	4,320	5,760
10 ,, 10 ,, 5 ft. deep	4,000	6,000	8,000
12 ,, 10 ,, 5 ,,	4,800	7,200	9,600
12 ,, 12 ,, 5 ,,	5,760	8,640	11,520
15 ,, 12 ,, 5 ,,	7,200	10,800	14,400
15 ,, 15 ,, 5 ,,	9,000	13,500	18,000
20 ,, 15 ,, 5 ,,	12,000	18,000	24,000
20 ,, 20 ,, 5 ,,	16,000	24,000	32,000

In laying-down a new purifier installation, I think all managers would be well advised to gauge their requirements by providing two (or not more than three) boxes, making provision for extending their needs when consumption warrants it by adding one or more boxes, and providing a valve or system of valves which would enable the additional purifiers to be connected-up without inconvenience or interruption of operations in any way. Thus, instead of providing (say) four 12 ft. square purifiers at the outset for a make of 11,500 c.ft., the manager might arrange for two boxes each 20 ft. by 15 ft., or for three boxes 15 ft. by 12 ft. Then, when his purification requirements increased by (say) 50 or 100 p.ct., he could easily and cheaply add to his existing installation to obtain this increased capacity, without the need for dispensing with the old purifiers, which would still be serviceable.

In many old purifier installations where there are four purifiers there will often be found an old and wasteful centre valve which only works three purifiers on and one off, thereby only having 75 p.ct. of the purifier area available for work. Where this is the case, a more modern valve arrangement would increase the purifying area by a valuable amount.

In the case of water-lute purifiers—now fast going out of date—I fear that gas managers generally, particularly on the smaller works, are apt to be too neglectful of simple precautions in their operation. For instance, in visiting many gas-works every year, I find there is a tendency to overlook the importance of the water in the purifier lutes, which I frequently find to be stagnant, and sometimes of an acid character. Water in purifier lutes should be renewed much more frequently than is the case at present. Again, when emptying and recharging purifiers, insufficient care is taken to see that no spent oxide gets into the lutes. This oxide, having an acid reaction, has a corrosive effect on the purifier cover sides which are sealed in the lutes.

The point to be borne in mind, whatever type of installation is decided upon, is to get the full capacity out of the installation and to keep labour costs down to the lowest possible limit. In many small works to-day, where the total staff (including manager) is perhaps three, one frequently comes across instances where purifiers are being changed more than once a week—sometimes every two or three days in winter—whereas, with the proper area, they would run almost as many months. Such a proceeding is, of course, expensive and wasteful, particularly in labour, and is altogether too near the margin of safety. Moreover, the manager could be far better employed in more important duties than in the worry attached to the constant changing of purifiers. Thus it is imperative that the purifier installations should be of ample capacity.

Where three or more purifiers are in use, they should be so arranged that any box can be put out of action at will, or the rotation of working arranged in any desired manner. In the application of any such system, it is essential that complicated mechanism should be avoided, and that the principles and methods underlying the adoption of the arrangement should be simple.

It is generally recognized in the profession that, to get the best out of the purifiers and the purifying material, the reversal of the flow of gas is a great asset. It has been found in many cases that, by reversing the flow after a purifier has given a foul test, or after commencing to throw excessive back-pressure, the purifier has continued to function for a further period, thus enabling the oxide to take up its full quota of sulphur before requiring the changing of the purifier. In some works, particularly the smaller ones, a purifier has often the unhappy trait of throwing back-pressure at inconvenient times, and has to be either cut out altogether or changed. By the adoption of reverse flow, this can often be temporarily cured, the back-pressure soon showing relief.

Most gas engineers are familiar with the Weck centre valve, which has had a long vogue in purifying installations; but such a valve only lends itself to one sequence of operations—viz., 1 2 3 4, 2 3 4 1, 3 4 1 2, and so on, and, of course, is not designed for reversing the flow of gas, though this can be done by interposing a four-way valve connecting the inlets and outlets together. In this method, however, if you reverse one purifier, you reverse the whole set.

There are other methods of reversing the flow of gas in purifiers, by the employment of separate valves for each box, in addition to the main or centre valve; but whatever method is chosen, it is undoubtedly a distinct advantage to be able to reverse the flow at will, and particularly so if any desired purifier can be so reversed without interfering with the others, and avoiding any change in the order of the boxes.

It is in this respect that the "Vulcan" valves excel. By their adoption one is able to get any sequence of working which may be desired, as well as to reverse any individual box. To illustrate what this means, I would mention that, by their use, with two purifiers twelve distinct operations can be obtained. With three purifiers working it is possible to get 78; and something over 600 operations if applied to four purifiers. Naturally, no such number of operations is ever called for in actual practice, but the figures mentioned serve to show the almost universal character of the "Vulcan" valves.

It is to be remembered that with these valves any desired rotation of working can be obtained, any purifier or purifiers can be put out of action, and the upward or downward flow of gas in any one or more purifiers can be applied at will. The valves themselves are simple in construction, and by means of indicators the required changes are quickly accomplished and easy to understand.

Fig. 1 shows the most generally adopted method of flow of gas through purifiers, the gas entering underneath the bottom tier of grids—as shown by arrows—and being taken off at the top.

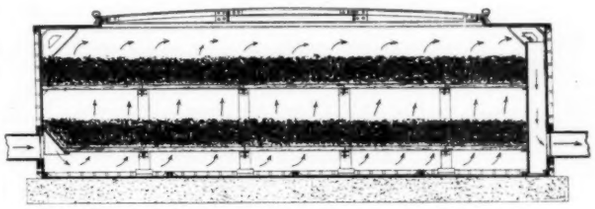


Fig. 1.

Fig. 2 shows the alternative method of making the inlet at the top and taking the gas off at the bottom, which, as previously stated, is of great advantage.

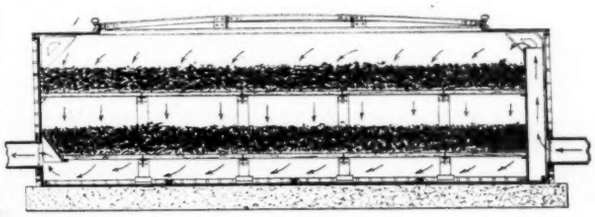


Fig. 2.

With the "Vulcan" valves referred to, one is able, by the simple movement of a particular valve, to utilize either of the above methods at will.

The reversing system in connection with purifiers also lends itself readily to a method of working which could be adopted with advantage—viz., the passing of the gas between the two tiers of purifying material, and taking it out from the bottom

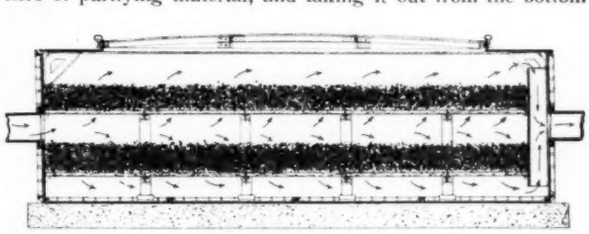


Fig. 3.

and top simultaneously, as shown in fig. 3. The gas flows into the centre chamber and passes upwards and downwards through oxide, being taken off at the top and bottom by the

outlet box. By putting the valve at reverse, the gas flows in the opposite direction, as shown in fig. 4.

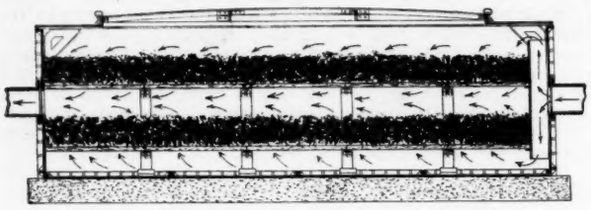


FIG. 4.

This reversal process can be effected as often as necessary, so that the whole of the oxide may be thoroughly permeated by the gas, and the sulphur extracted.

It might be thought, from a first view of this arrangement, that most of the gas would naturally pass through the top tier and very little gas through the bottom tier, by reason of its natural tendency to rise. For a short time after the purifier is put on, more gas will undoubtedly pass upwards than downwards; but as the sulphur is taken up, and the pores of the purifying material begin to close, the flow of gas will soon equalize itself, and then readily pass in both directions.

Purification by oxide is, of course, greatly facilitated when the purifying material is of the proper consistency and the moisture content is not over (say) 40 p.ct. It is therefore advisable to have the revivification floor covered, especially during rainy weather.

Revivification *in situ* is a process which can be overdone; but many of my hearers, I have no doubt, with practical experience of this method, could enlighten me a good deal on the efficacy or otherwise of the principle.

Discussion.

Mr. W. MILLAR (Cookstown) remarked that the author said it was not advisable to have a depth of each layer of oxide in the purifiers of more than 30 in. He (the speaker) had constructed a pair of 12 ft. square concrete boxes, with one valve controlling either the upward or downward direction. They were 5 ft. deep; and he found one could have 4 ft. of material without any trouble, provided the gas was not being put through too quickly. He had never suffered from back-pressure since he put these purifiers down. The paper would be helpful to many of the members.

Mr. J. MCNICHOLL (Cork) had noticed that all the improvements of makers of purifiers meant extra valves; and engineers knew that this meant a multiplicity of trouble. The best of valves would leak at times; and in order to correct a leaky valve in connection with purifiers, it was often necessary to shut-down the works. Therefore it struck him that they might possibly ultimately be harking back to the old water-sealed centre valves, which never leaked. Provided that they had purifiers and mains of ample capacity, and moderate pressures, they would be quite safe with these old valves. Almost every maker at present had some special and wonderful valve, by means of which one could obtain all sorts of combinations in connection with the working; but, as he had said, with more valves there was more risk of leakage. If purifiers were large enough, there was no need to suffer from back-pressure. When he first went to Cork, it was necessary to change the purifiers several times during the winter on account of back-pressure; but since he had erected a new installation the total back-pressure for four purifiers and two catch boxes was only about ½ in. Thus it was hardly ever necessary to put them off because of back-pressure. If they had a valve for reversing purifiers, it would be an advantage to have catch boxes, so that a small leak at any time past the valve would be taken up.

Mr. T. FRIZELLE (Holywood) had been struck by the space shown by the author in the centre of the purifier between the top and bottom layers of oxide; and the thought had occurred to him that this would be lost space to a certain extent. The purifier in that case would not last as long as if the whole box was filled with oxide. He had in his works four purifiers 18 ft. square and 5 ft. deep; and they ran from twelve to fifteen months without a change. But they filled the boxes. They could reverse them.

Mr. J. A. PEMBERTON (Sligo) said the author told them that if they allowed spent oxide to get into the lutes, it would have an acid reaction and set up corrosion on the purifier cover sides. This, of course, they understood; but could the author suggest any preparation by the aid of which they might try to arrest this corrosion, provided they took all possible precautions to prevent this oxide falling into the lutes?

Mr. MILLAR said that with old water seals he used to be bothered with corrosion, and he found that engine oil thrown into the water did away with all the trouble.

Mr. BLAKELEY replied that he was not trying to tie them down to a depth of 30 in.; but this was the more economical method of working. With deeper layers it was necessary to have an oxide of a light nature. Mr. McNicholl had spoken of a multiplicity of valves meaning risk of trouble. He (the speaker) was not out to advertise any particular thing. There were plenty of reversing valves on the market. The point he would suggest regarding the old type of centre valve was that if the valve did go wrong everything would be thrown out of gear. With the new type, one could put a box off and continue to carry on operations without any interruption of gas making. Reference had been made to the space between the different layers of oxide. This was not necessarily to scale. So long as they had sufficient area to allow a passage of the gas, they would be all right. The space had the advantage of allowing of working both ways. The eating-away of the side plates of purifiers had, he believed, been in the past, particularly in smaller gas-works, somewhat of a bugbear. There were various preparations on the market for assisting to resist the corrosive effects of oxide; and a coating of oil was a good thing. The great point was to prevent oxide—and spent oxide in particular—dropping into purifier lutes. More corrosion, he believed, took place on this account than from any other cause.

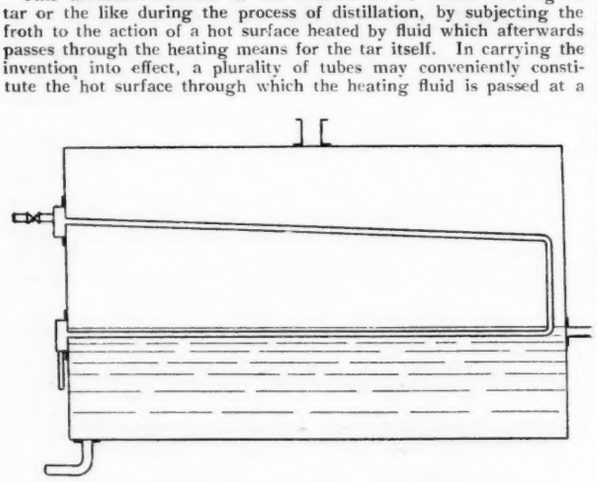
REGISTER OF PATENTS.

Distillation of Tar.—No. 255,919.

DAVIDSON, W. B., MICHIE, A. C., and MUDDIMAN, E. W., all of Newcastle-on-Tyne.

No. 8716; April 1, 1925.

This invention consists in the elimination of undue frothing of tar or the like during the process of distillation, by subjecting the froth to the action of a hot surface heated by fluid which afterwards passes through the heating means for the tar itself. In carrying the invention into effect, a plurality of tubes may conveniently constitute the hot surface through which the heating fluid is passed at a suitable temperature; the tubes being arranged in the vapour space above the normal level of the substance undergoing distillation. This arrangement is particularly adaptable for use in that type of still in which heat is applied to the contents immediately below the surface. The froth, which contains a considerable amount of water, is broken up upon making contact with the hot surface, and causes momentary condensation of some of the heating fluid, with the result that less heat remains for the contents, and temporary retardation of the dehydration occurs until the froth subsides.



An Anti-Priming Tar Still.

The accompanying drawing illustrates one practical embodiment as applied to a still of the type described in patent No. 196,399 [see "JOURNAL," Vol. 162, p. 602]. The apparatus comprises a plurality of closely-pitched steam-heated tubes arranged in horizontal **U** formation, of which the lower series of tubes is adapted to extend immediately below the surface of the tar or the like. These tubes are maintained at a temperature of 120° to 160° C.

Safety Ventilation Devices.—No. 255,996.

COWAN, H., and the PARKINSON STOVE CO., LTD., both of Stechford.

No. 14,016; May 28, 1925.

This invention seeks to ensure that there shall always be adequate ventilation in a room wherein gas apparatus is functioning—such as in a bathroom fitted with a geyser.

Briefly, the invention consists in including an auxiliary tap interposed in the gas supply to the normal control tap; the auxiliary tap interlocking with a ventilator, door, or window.

Illustrations are given of a tap universally jointed to a door, and of a plug cock connected to which is a toothed quadrant engaged by a rack on a window frame.

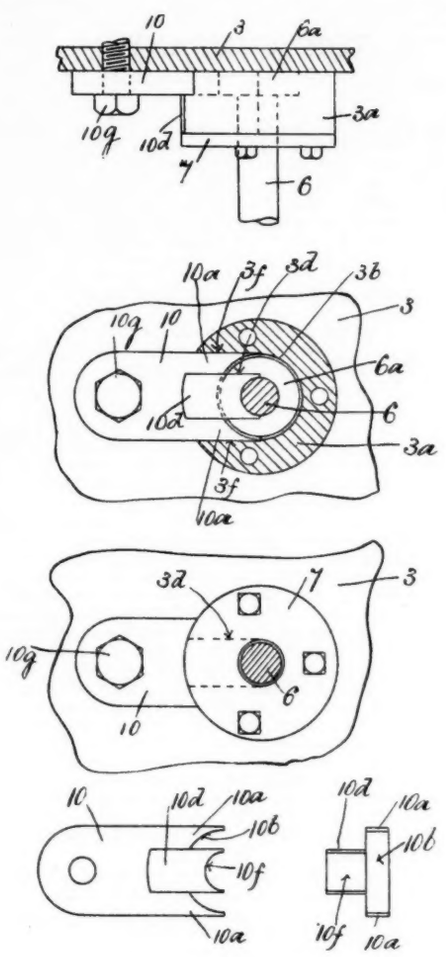
Valves for Gas Mains.—No. 255,998.

HARRISSON, F. J., of Norbury, S.W. 16, and DRAKE, J. W., of Halifax.

No. 14,114; May 29, 1925.

The object of this invention is to provide a design of valve which will render easy the repair, &c., of the valve itself and of other parts of the fitting. The complete apparatus described is particularly applicable to purifiers; and the chief drawing which accompanies the specification is of a purifier valve. This, however, we do not repro-

duce, as the detail drawings of the valve boss, &c., suffice to make clear the invention.



Removable Valve Head for Purifiers, &c.

The valve 3 is mounted upon a spindle 6, which is connected to it by a fixing plate 7 covering the head 6*a* of spindle 6. By these means, when the spindle 6 is rotated in one direction or the other direction its screw thread will cause the valve 3 to advance or to recede, connecting with one of two seatings.

To enable the valve 3 to be detached from its spindle 6, a cavity 3*b* is formed in the boss 3*a* to receive the head 6*a* of the spindle. The body part of the spindle 6 passes through a lateral opening 3*d* in the boss 3*a*. When the head 6*a* of the spindle 6 is being slid laterally through the broader opening 3*f* leading to the cavity 3*b*, the body part of the spindle 6 will be passing through the slot 3*d* in the hub 3*a*. The head 6*a* of the spindle 6 is secured in the cavity 3*b* by a separate fixing member 10, the body part 10*a* of which takes into the larger lateral slot 3*f* made in the boss 3*a*, so that its curved surface 10*b* will fit against the periphery of the head 6*a* of the spindle 6, while the curved surface 10*f* on a projecting part 10*d* of the member 10 will take into and fill the lateral space 3*d* in the hub 3, and will extend sufficiently far from the body part 10 to fill the lateral space 3*d* in the hub 3 while its curved end 10*f* will fit against the body part of the spindle 6. Thus a portion of the part 10*d* will overhang the head 6*a* of the spindle.

By the employment of this fixing member 10, when the retaining plate 7 is in position on the boss 3, and the fixing screw 10*g* is secured to the body of the valve 3 and through the body of the member 10, an efficient detachable mounting is provided for securing the valve to its spindle.

The valve seatings are attached by screws to their supports, and hand holes are provided in the valve casing. Thus the important wearing parts of the valve are removable without disturbing the valve spindle.

Carbonizing Coal.—No. 256,038.

RODGERS, R. L., of Chicago.

No. 18,109; July 15, 1925.

This invention is for a method and apparatus particularly useful for low-temperature carbonization, whereby may be produced, first, a free-burning, smokeless, and sootless fuel, and secondly, valuable bye-products. Among the objects of the invention are the reduction of time necessary for the carbonization of a charge, and the production of a uniform product of superior quality.

The patentee employs batteries of comparatively small containers, wherein the coal is carbonized through the medium of fused salts—for instance, a mixture of 75 p.ct. of calcium chloride and 25 p.ct. of sodium chloride.

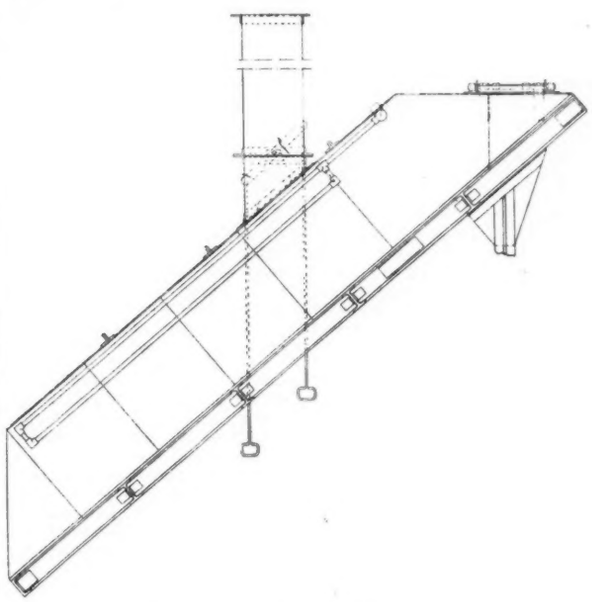
The specification contains little mention of the gas made during the process; but the apparatus is fully described and illustrated.

Quenching Coke.—No. 256,142.

DRAKES, LTD., and DRAKE, J. W., both of Halifax.

No. 5663; May 29, 1925.

This invention consists in the main in the employment for coke quenching of a fixed inclined enclosed hopper having pipe connections to conduct water in the form of a spray to the whole interior thereof; the hopper being provided with a chimney for the escaping vapour, steam, and gases.



Enclosed Coke Quencher—Drakes, Ltd.

We reproduce a sectional side elevation of the hopper, which, it must be understood, is air-tight. A hinged door is mounted at its lower end, and one at its upper end; and appropriate mechanism is employed for operating these.

The water-spray pipes spring from a transverse supply pipe and are arranged to give even distribution of water over the whole charge.

It will be observed that the chimney is fitted with a damper under the control of the attendant.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Aug. 25.]

Nos. 20,127—20,691.

CLARK, F. W.—"Manufacture of gas from coal, &c." No. 20,490.
LAMPREY, R. H. B.—"Carbonizing retorts." No. 20,670.
MITCHELL, G. P.—"Flue device for gas ovens." No. 20,128.
SOUTH METROPOLITAN GAS COMPANY.—See Lamprey, R. H. B. No. 20,670.
TRAVERS, M. W.—See Clark, F. W. No. 20,490.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

City and Guilds of London Examinations.

SIR,—In view of the large number of unsuccessful candidates in the recent examinations of the City and Guilds of London Institute in Gas-Works Practice and Gas Supply Practice, we have arranged a special course extending over the winter session, to assist these students to achieve success.

Incidentally, every student submitted by us for these examinations was successful.

We shall be pleased to supply full particulars to all who may be interested.

ARTHUR COE,
Principal.

The Gas College,
3, Thrum Hall Lane, Halifax,
Aug. 30, 1926.

MISCELLANEOUS NEWS.

BARNET DISTRICT GAS AND WATER COMPANY.

The Parliamentary Bill.

The Ordinary Half-Yearly General Meeting of the Company was held on Monday, Aug. 23, at the Cannon Street Hotel, E.C.—Mr. WILLIAM CASH, F.C.A., presiding.

The SECRETARY (Mr. E. D. Davey) read the notice convening the meeting; and the report of the Directors and the statement of accounts were taken as read.

The CHAIRMAN, in moving their adoption, said the accounts were now presented in such a form that the proprietors had before them the comparative figures for the corresponding half of the previous year; and therefore it was unnecessary for him to say much about them. With reference to the gas revenue account, he would point out that the price remained the same at 10½d. per therm. Up to June 30, of course, they had not been faced with any difficulty in securing supplies of fuel; but now, in consequence of the prolonged coal stoppage, they were having to buy substantial quantities of foreign coal at prices very different from what they would have had to pay had their contractors been able to fulfil their contracts. Other companies had had to raise the price of gas, and as far as the Barnet Company were concerned an increase in price was inevitable. It was a lamentable condition in which the country found itself; and they must all hope that an honourable and satisfactory settlement of the dispute might be arrived at without delay, and that the need might thus be removed of importing a national product such as coal, which was the life blood of gas undertakings. The price of coal also affected the water branch of their business, though naturally not to the same extent as the gas. For the period under review the unaccounted-for gas had been less than 6 p.ct. Still referring to gas, he might say that the net cost of coal and oil for the half-year, after deducting returns from residuals, which had not done so well (they were down on the six months), reckoned in pence per 1000 c.ft. was only very slightly more than a year ago, and substantially less than in the December half of 1925. They had connected 265 new consumers (which was a satisfactory record), and had laid over 5000 yards of new mains. The alterations to the showrooms and offices had been completed, and a great improvement in them had been effected.

The cost of pumping water had been less; there having been a saving in fuel used of over 200 tons. At the Roestock Station the new plant had given very good results. The water revenue continued to increase, and was up £2300 on the half-year. The new consumers numbered 529, while 7300 yards of mains had been laid. The consumption of water per head came out at just under 30 gallons. It was satisfactory to note that the growth of the business was being maintained at a rate slightly higher than the estimates that the Company had placed before Parliament. During the last half-year the most important matter with which they had had to deal was the Bill, the promotion of which was authorized by the proprietors last February, but which had not yet completed its passage through Parliament. It was felt by the Board that they might fairly claim a share of the Hertfordshire water. Out of a total population supplied of 110,300, there were in Hertfordshire 31,500, and in Middlesex 78,800; while if they took the area of supply, which was 47 square miles, 28·14 square miles were in Hertfordshire, and 18·86 square miles in Middlesex. Again, taking the watershed area of the 47 square miles, 29·97 square miles were in the Thames, and 17·03 square miles in the Lee; while of the population of 110,300, 50,800 were in the Thames area, and 59,500 in the Lee area. These were the facts on which they based their claim to a further supply of Hertfordshire water. Of course, the mere county boundary was no real test as to whether or not water should be taken out of one county into another; but however this might be, the fact remained that the Company met with very strenuous opposition in the House of Lords (which was for their Bill the First House), mainly from the Hertfordshire County Council, the Metropolitan Water Board, and the Lee Conservancy Board. They had been told that if they abstracted water from the area where the wells were proposed to be sunk, there would be a risk of their depleting existing supplies; and the Hertfordshire County Council said they ought to take a supply in bulk from the Metropolitan Water Board. Apart, however, from the question of price (which the Directors thought was far too high for them to pay), the Company did not desire to be in the hands of the Metropolitan Water Board, whose proposals raised certain engineering difficulties. Therefore they could not see their way to agree to the suggestions put forward. To show they were anxious not to create any risk of damage, the Directors offered to withdraw from the scheme the Bayfordbury well, although from their own point of view they were sorry to do so, because they thought the scheme as a whole was a right and proper one for the area. Finally the Committee of the House of Lords passed the Bill for the Stanborough well, and there the matter stood at present—consideration of the measure by the House of Commons being postponed until the autumn session of Parliament. This postponement was very unfortunate, but it arose through no fault of the Company, and the Directors also regretted the opposition that had arisen to their proposals, because they were always anxious to maintain the most friendly relations with the local authorities. Other bodies, who were concerned chiefly with the question of charges, had temporarily stood on one side; and regarding these he might say that the increased scale of charges had been most carefully considered before inclusion in the Bill. He thought the increase would not have been wholly permanent; and even if they got the whole of the charges they had asked for, the revised basis would only be some 50 p.ct. above pre-war. The cost of this Parliamentary fight was heavy, and must be a burden upon both consumers and shareholders in the future. Power had been sought in the Bill to purchase the Hatfield Water-Works from Lord Salisbury, and terms had been agreed to, subject to the approval of Parliament. Mr. Haseldine and the staff had worked extraordinarily hard in the preparation of the enormous amount of material necessary in connection with the Bill; while expert advisers and counsel had also rendered every possible assistance. The Directors, too, had given most earnest attention to the matter, and could only hope that in the House of Commons they might be as successful as in the House of Lords—thus enabling him to report in six months' time that the measure had received the Royal Assent.

The DEPUTY-CHAIRMAN (Dr. J. W. L. Glaisher, F.R.S.) formally seconded the resolution.

Mr. A. W. OKE said the report on the half-year's working was a very satisfactory one; and he congratulated the Board.

Mr. F. R. SMITH asked whether the heavy Parliamentary charges would be treated entirely as capital expenditure, or whether any portion would be regarded as a revenue charge.

The CHAIRMAN agreed that it had been a satisfactory half-year. The final profit was £24,646, which compared with £23,071 for the December half-year. They had asked Parliament to give them power to deal with the expense of promoting the Bill either as a capital or a revenue charge. If it was granted as a revenue charge, it might have to be spread over a period of years; but in the judgment of the Board it would be much better to so treat the matter, and thus get rid of it.

On the proposition of the CHAIRMAN, seconded by Mr. ALFRED WOOD, dividends were declared, less income-tax, for the half-year ended June 30, at the rates of 10 p.ct. per annum on the "A," "B," and "C" stocks, and 7 p.ct. per annum on the "D" capital gas and water stocks, with a proportionate dividend on the new "D" capital water stock.

The CHAIRMAN moved, and Mr. TAYLOR seconded, a hearty vote of thanks to the officers and staffs, who had so well served the Company during a difficult period.

This was heartily carried, and suitably acknowledged by Mr. J. F. HASELDINE (the Engineer and Manager) and Mr. DAVEY.

The proceedings were brought to a close by a similar compliment to the Chairman and Directors.

WOMEN'S WAR ON SMOKE.

Reformers to Attend Abatement Conference at Birmingham.

Delegates from various women's social and educational associations will gather from all parts of the kingdom at the three-days' conference to be held this month in connection with the Universal Smoke Abatement Exhibition at Bingley Hall, Birmingham. Many of the leaders of the women's movement adopt the view that the subject of a smokeless kitchen is essentially a woman's question; and they are urging their supporters to take the opportunity of obtaining further enlightenment on the subject of gas heating and other smokeless methods, so that reports may be presented at the autumn and winter meetings of the societies.

An official reception will be given to the delegates on the evening of Sept. 7, at which Sir John Robertson, Medical Officer of Health for Birmingham, will deliver an address. On the following day papers on "Smoke Abatement and Housing" will be read by Mr. Raymond Unwin, Chief Technical Officer of the Ministry of Health, Councillor E. D. Simon, of Manchester, and Mrs. C. S. Peel, a well-known authority on domestic questions. Dr. Margaret Fishenden, of the Fuel Research Board, will deliver an address on Sept. 9 on "Smokeless Production of Heat and Power."

ILLUMINATING AND FUEL GAS IN CANADA.

The production of artificial gas in Canada in 1925 totalled 26,651 million c.ft., according to a statement just issued by the Dominion Bureau of Statistics at Ottawa. Of the total output, 13,507 million c.ft. was produced in the various gas plants, 12,124 million c.ft. in establishments engaged primarily in the production of metallurgical coke, and 1019 million c.ft. of still gas was recovered from petroleum refineries. The sale of artificial gas totalled 13,189 million c.ft.; the remainder of the output being used in the retorting plants. The 44 gas plants in operation in Canada in 1925 represented a capital investment of 46 million dollars, gave employment to 3084 persons throughout the year, and paid out over 5 million dollars in salaries and wages.

Morpeth Gas Light Company.—The gross profit for the year amounts to £3379, which, with £827 brought forward, gives an available sum of £4206. The Directors recommend a dividend of 6 p.ct. for the year on the preference shares (an interim dividend of 3 p.ct. was paid last February), and of 7 p.ct. for the year on the ordinary shares (an interim dividend of 2½ p.ct. was paid in February last). This will leave £1256 to be carried forward.

NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

In spite of the little progress made towards ending the coal deadlock, there has again been a certain amount of definite discussion on coal futures. Merchants are receiving numerous inquiries from the Continent, and in many cases collieries are indicating prices at which they will deliver when work is resumed. Naturally not much business has resulted, but second-class gas makes have actually been done at 16s. f.o.b. and at 16s. 6d. f.o.b. for odd cargoes, and good quality gas has been done at 20s. Wear Specials, when quoting at all, indicate 22s. 6d. Best bunkers have been sold at 18s. 6d.

These prices are, of course, an advance upon those prevailing before the strike, and not much business can be expected, owing to the necessity of quoting prices which will cover any possible settlement. Good demand is, however, anticipated, at any rate for a few weeks after the resumption of working.

COAL TRADE IN THE MIDLANDS.

From Our Local Correspondent.

The control is being more stringently enforced again. So far as the householder is concerned, the restriction of supplies is not severely felt; but with the advance of the season local administrations consider it necessary to look forward, and there have been sharp reminders that laxities will not be condoned.

Industrialists near the coalfields appear to be getting but a very small share of the increased output from the pits. This is easily explained by the more urgent need of industrial interests farther away. Outcrop coal, which is mainly distributed within a small radius, is playing an appreciable part in relieving the necessities of Midland manufacturers, and the supply continues to increase. Some manufacturing firms which are denied coal from their own pits are enabled to keep going by regular reinforcements of outcrop coal got by the miners who ordinarily man the pits. One good result which has accrued from the increasing amount of labour available in the various Midland coalfields is that sorting is again receiving a certain amount of attention. If it is only possible to give one screening the boon is highly appreciated. When the essential services have received their apportionments, and collieries have reserved what they require for their own boilers, there is not very much slack left for general distribution.

The coke market is better supplied. Substantial consignments are now coming in from Germany at prices which compare favourably with those required for the dwindling output from Durham and South Wales. Continental shippers are offering coke at about 60s., delivered here, which is 10s. or more under the rates that manufacturers have had to pay for earlier consignments.

CURRENT SALES OF GAS PRODUCTS

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Aug.* 30.

Tar products generally are in short supply, and prices continue to firm up. There is no actual quotation for pitch to-day, but a price in the neighbourhood of 100s. per ton is talked of. No business is being done, however, as there is no material available.

The demand for tar continues, but buyers are finding it difficult to obtain supplies.

Creosote is firm at from 7¾d. to 8d. per gallon, with little offering.

Pure benzole and pure toluole are firm at about 3s. 3d. per gallon. Solvent naphtha is steady at 2s. 3d. per gallon for 95/160 quality.

Tar Products in the Provinces.

Aug. 30.

There is little fresh to report concerning the markets for tar products.

The continuance of the coal strike is causing pitch and creosote to remain very firm.

White products are still in fair demand, and in many districts supplies are short.

The average values for gas-works products during the week were: Gas-works tar, 67s. 6d. to 72s. 6d. Pitch, East Coast 97s. 6d. to 100s., f.o.b. West Coast—Manchester, 90s. to 92s. 6d.; Liverpool, 92s. 6d. to 95s.; Clyde, 96s. to 98s. Benzole, 90 p.ct. North, 1s. 11d. to 2s.; crude, 65 p.ct. at 120° C., 1s. 4d. to 1s. 5d., naked at makers' works; 50-90 p.ct., naked, North, 1s. 11d. to 2s. Toluole, naked, North, 1s. 11d to 2s. nominal. Coal-tar crude naphtha, in bulk, 9d. to 9½d. Solvent naphtha, naked, North, 1s. 9d. to 1s. 10d. Heavy naphtha, North, 1s. 1d. to 1s. 2d. Creosote, in bulk, North, liquid, 6¾d. to 7d.; salty, 6½d. to 6¾d.; Scotland, 6½d. to 6¾d. Heavy oils, in bulk, North, 7¼d. to 7½d. Carbolic acid, 1s. 4d. to 1s. 5d. prompt. Naphthalene, £11 to £14; salts, 90s. to 100s., bags included. Anthracene "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

Erratum—The price of East Coast pitch was inadvertently given in last week's report as 67s. 6d. to 100s. This quotation should have been 97s. 6d. to 100s.

Bognor Gas Company.—It was reported at the half-yearly meeting of the Company that there was a balance of £16,020 at the credit of profit and loss account, from which sum the Directors recommended the payment of the maximum dividends, leaving a balance of £13,091 to be carried forward. The increase in gas consumption was over 10 p.ct., while electricity showed an advance of 25 p.ct. The extra £1 per ton being paid for foreign coal compels the Board to add 6d. per 1000 c.ft. to the price of gas. At a subsequent extraordinary meeting, the Board were authorized to raise £26,200 new capital.

TRADE NOTES.

Bray Burners.

A series of illustrated lists of burners for indoor and outdoor lighting for the coming season has been prepared by Messrs. George Bray & Co., Ltd., of Leeds. A booklet dealing with some new Bray burners for modern gas lighting has been produced in attractive style for distribution among the general public; and the firm will be pleased to forward supplies to gas companies for this purpose.

"Top-Hat" Cookery.

This is the title of a booklet written by Mrs. Ada J. Davey, the Institute of Patentees, Inc., 39, Victoria Street, S.W. 1, in which she describes the advantages of the "Top-Hat" cooker. This, briefly, is a vegetable saucepan combined with a lid in the form of a top hat. The saucepan proper is provided with a gauze cover on which can be placed puddings, &c. Steam from the saucepan is condensed in the "top-hat" lid, and the water runs back into the pan. Consequently, once water has been placed in the pan, no further attention on the part of the cook is needed, and the latent heat of condensation, which normally is lost, is recovered. Considerable economy in fuel is claimed.

Steel Belts.

The Steel Band Conveyor and Engineering Company, Ltd., of Birmingham, have published an illustrated booklet describing their steel bands for power transmission. This method of transmission was introduced about twenty years ago; and now there are upwards of 5200 main drives in successful operation in Europe. The applications are varied, and there is practically no limit. Generally there is only one joint (lock) in each band, and that is made of steel also, and embodies a combination of screwing and soldering to secure tightly the ends of the band, and curved wings which prevent any undue motion of the band as the lock leaves the pulley and proceeds into the straight path. A band can have two or more locks where necessary. The firm state that, with all the drives in existence, there has not been a single accident. The rounded edge of the band can be touched while it is running. Should a band completely fracture, it would simply open and fall between the shafts.

EXTENSIONS.

Purifying Plant at Evesham.

Alderman Fisher, moving the adoption of the report of the Gas Committee by the Evesham Town Council, stated that the advisability of improving the purifying plant at the works was under consideration. The present purifiers, which had been in use for over twenty years, showed signs of considerable wear; and they were also inadequate for the greatly increased make of gas with which they had to deal.

Wisbech Lighting Company.

Notwithstanding the competition of electricity, the Wisbech Lighting Company have had another very successful half-year. Presiding last week over the ninety-fifth ordinary general meeting of the shareholders, Mr. Frank Oldham, the Chairman, reported that the profit for the half-year ended June 30 last amounted to £2112. The miners' strike had caused anxiety to the Directors, but fortunately the Company possessed a good reserve stock of coal, and an additional supply had been obtained from abroad. The installation of vertical retorts, he said, was progressing satisfactorily; and as these would replace the existing horizontal system, the Company's renewal fund had been utilized, the payments therefrom having amounted to £4527. The sum available for dividend was £7502, and the Directors recommended the payment of dividends at the rate of 12 p.ct. per annum on the ordinary stock certificates, and at 11 p.ct. per annum on the ordinary shares, both less income-tax; the transferring of £2636 to the renewals funds; and the carrying forward of the balance of £3636. The balance-sheet and statement of accounts were adopted, and dividends declared as recommended. Subsequently an extraordinary general meeting was held for the purpose of authorizing the raising of £10,000 additional capital by the issue of new ordinary £5 shares. In proposing a resolution to this effect, the Chairman remarked that the Company were very fortunate in possessing such an able Engineer and Manager in Mr. John Green. The demand for gas was increasing so rapidly that additional plant was necessary to cope with it; and it was to that end that the fresh capital was required. The meeting gave the Directors power to raise the new capital as indicated.

Sevenoaks Public Lighting.—The Sevenoaks Gas Company have secured a contract for public lighting for a period of five years, as well as an order to erect fifty additional lamps. The Company are paying interim dividends of 10 and 7 p.ct. for the half-year.

Position of the Accrington Gas Undertaking.—In a special report on the position of the Accrington and District Gas Board, arising out of some comments made by an Inspector at a recent Government inquiry, the General Manager (Mr. A. J. Harrison) says that the capital indebtedness per 1000 c.ft. of gas produced is lower now than at any previous period, with the plant and mains in better condition than at any time in the Board's history. The Board's cost of production is over 2d. per 1000 c.ft. less than the average of 70 leading municipal undertakings. He can find no record of a single municipal concern carrying the same capital expenditure that is selling gas at a cheaper average rate; and he estimates that if gas were being manufactured under the old conditions to-day, the cost would be at least 6d. per 1000 c.ft. more, while it would not have been possible to produce more than 75 p.ct. of the present output without extending the plant.

Price of Gas at Leeds.—The Leeds Corporation Gas Committee, on Aug. 24, decided to increase the price of gas, owing to the high cost of imported coal. From the October meter readings, the rate will be advanced by 6d. per 1000 c.ft. from 3s. 9d.

Dearer Gas at Yeadon.—The Yeadon and Guiseley Gas Company have been forced by the dearness of foreign coal, now having to be used at the works, to increase the price of gas by one-sixth of a penny per therm, making it 10d. per therm. The increase takes effect from the meter readings for the half-year ended June last.

Bingley Showroom Proposal.—The Ministry of Health, it is understood, have rejected for the present the application of the Bingley Urban District Council for sanction to appropriate a plot of land in Main Street (recently acquired by the Council with other land) for the purpose of erecting gas showrooms. At the inquiry there was strong opposition by the local Chamber of Trade.

Increase in Gas Prices at Sunderland.—The Sunderland Gas Company announce an increase in the price of their gas supplies of 1s. 6d. per 1000 c.ft., making the price 4s. for lighting, heating, and cooking, and 3s. 10d. for power purposes. The increase is due to the Company having to purchase foreign coal; and should there be an early settlement of the coal strike, it will not be necessary to charge the full amount of the increase.

Hathersage Gas Company.—According to the report of the Hathersage and District Gas Company for the year ended June last, there was a total profit for the year of £1907, which, with the unappropriated balance from the previous year, makes £3509. After deducting an interim dividend which absorbed £800, and debenture interest £200, there is a disposable balance of £2582. The Directors recommend the payment of a final dividend of 5 p.ct. on the paid-up capital (making 9 p.ct. for the year), and the carrying to reserve of £200.

Storm Causes Gas Leak at Ipswich.—A leak in a gas main at Ipswich recently caused the death of two women. Mr. George A. Mallett, Secretary of the Ipswich Gas Light Company, said that the Corporation were laying a sewer, and a trench about 15 ft. deep had been dug, which exposed the gas and water mains. In consequence of a heavy storm the trench became flooded, causing a subsidence of the soil. This in turn caused the water main to sag and break. A further subsidence brought down the gas main, which was fractured; and during the night of Aug. 18 the gas escaped through the soft earth, and found its way through the floor of the cottage in which the women lived.

The Horstmann Gear Company, Ltd.—The firm will exhibit a comprehensive range of their "Newbridge" automatic gas controllers during the forthcoming annual meeting of the Institution of Public Lighting Engineers, to be held in Newcastle from Sept. 14 to 16. Their exhibit will include the popular Type 3A/UNI controller, models for automatic control of main taps up to 2 in., suspension controllers for use with suspension lamps, and the Type 1A controller fitted with patent solar compensating dial which automatically varies with the times of lighting and extinguishing throughout the year, and only requires winding. The main tap controllers for operating "iron" gas mains ½ in., ¾ in., 1 in., &c., will prove specially interesting, as these can now be fitted with a selective device which enables the user to cut out operation on any day or days per week.

Macclesfield Gas Department.—In his annual report for the year ended March 31, Mr. H. Curtis, Engineer and Manager of the Macclesfield Gas Department, states that there has been an increase in the consumption of gas amounting to 100,514 therms, which is 8·54 p.ct. above last year's figures. The prepayment system now amounts to 44·3 p.ct. of the whole consumption, and shows an increase of 6·8 p.ct. above last year's figure. The total quantity of gas sold was 1,276,780 therms, and the average price received for all gas supplied was 8·7 per therm. After paying £5619 towards the interest and sinking fund, the net profit for the year was £2418. The number of free gas cookers in use at the end of the year was 4584, and of free gas fires 1377. The number of cookers, fires, radiators, &c., sold or let out on hire-purchase during the year was 437, against 135 last year. During the year 155 new service pipes were laid and 84 new meters fixed; the total number of meters in use at the end of the year being 10,163, an increase of 84. The capital account (total amount expended) now stands at £121,200, and the gas-works debt, after deducting the amount standing to the credit of the sinking fund, is £36,990.

Barnsley Gas Company and the Coal Strike.—The position of the Company arising out of the coal stoppage was referred to at the annual meeting by the Chairman (Mr. E. G. Lancaster). He said that, profiting by previous experience, they had steadily accumulated stocks of coal, which had enabled them to come through until last week, the seventeenth of the strike. They were, however, rapidly coming to the end of their supplies. Their new water gas plant had been invaluable to them in the crisis. Water gas was more costly to make than coal gas; but had it not been for the help of this plant, they would have had to close down the works and cut off the supply some weeks ago. The Barnsley Company got temporary help from outcrop coal for their boiler fires, but foreign coal would have to be bought for gas-making purposes. It would cost at least three times the normal amount, and would undoubtedly mean an extra expenditure at the rate of £40,000 per annum. To meet this increase, they would have to charge their maximum legal limit per therm after the meter reading of the September quarter. The only alternative was closing down; and he had consulted both large and small consumers, and they were unanimous in saying that they would rather pay an increased charge for a time in preference to the inconvenience of their gas supply being cut off. Even then this would mean a heavy loss to the Company, because the increased cost of the coal would not be covered by the extra cost of gas.

Increase of Price at Manchester.

The Manchester Gas Committee have raised the price of gas, by 6d., to 3s. 10d. per 1000 c.ft. For four complete months the Department have supplied gas at normal rates, though entirely cut off from their normal coal supplies. That they have been able to do so is due to the foresight shown by the Committee and staff in the accumulation of stocks. Since the stocks were exhausted, the Department have had to rely, as have all similar undertakings, on foreign coal at greatly increased prices; and had they been dependent on such supplies from the beginning of the coal dispute, gas users would have felt the effects, not only in prices, but in supply also, long before this. Three months after the beginning of the strike, the Manchester Gas Department were still using some of the coal which they had had in stock—thanks to which they had been able to provide throughout this period not merely for usual daily consumption, but for a greatly increased consumption of gas. Without any falling-off in either pressure or quality, some 124 million c.ft. more than usual have been supplied, which meant burning 1200 tons of additional coal every week; and the consumption has been increased by something like 15 p.ct. over the normal. Now that the stocks of coal which were in hand before the strike have been exhausted, the Department are still maintaining the same pressure, supply, and quality; but the price of foreign coal is necessarily reflected in the increase in the price of gas.

Through the increased cost of coal, the price of gas at Bolton is being advanced 3d. per 1000 c.ft. all round.

Owing to the coal strike, the daily supply of gas at Clowne has been limited to the three hours from 8 p.m. to 11 p.m.

The Directors of the Linlithgow Gas Company have intimated that from to-day the price of gas will be increased by 10d. per 1000 c.ft.

The Directors of the Seascale (Cumberland) Gas Company have found themselves compelled by the coal situation to increase the price of gas to 12s. per 1000 c.ft.

An extraordinary increase in the consumption of gas since the coal strike has occurred at Northampton. The increase up to June 30 amounted to 24 million c.ft.

At Huddersfield, on Aug. 13, Edwin Lord, a labourer, of Greenhead Road, Huddersfield, was sent to prison for six months with hard labour on a charge of stealing £1 15s. 5d. from a gas meter belonging to Harry Bradley.

In the Leamington Floral Decorations Competition, 1926, the first prize in Class 2 (hanging baskets) went to the Leamington Priors Gas Company, whose baskets were declared by the Judges to be well furnished and effective.

The Directors of the Dalkeith Gas Light Company, Ltd., have decided to increase the charge for gas from 4s. 2d. to 4s. 7d. per 1000 c.ft. The increase is due to the cost of foreign coal. The price of coke has also been advanced.

George M'Kenzie, a Dundee labourer, pleaded guilty in the Dundee Sheriff Court to forcing open a prepayment meter in his house, and stealing 9s. 10d. Sheriff Malcolm imposed a fine of 15s., with the option of ten days' imprisonment.

A slight fire occurred on the night of Aug. 27 in a warehouse attached to the Halifax Corporation Gas-Works. The outbreak was among some waste in the meter repairing shop; but the fire brigade quickly had it subdued, with little damage done.

The Mirfield Gas Company have decided that, owing to the high cost of imported coal, the price of gas from to-day must be advanced 1d. per therm. The Company have informed the local District Council that, in present circumstances, it is not possible to supply gas for street lighting.

During the last municipal year the Darwen Gas Department made a profit of £1005, compared with a loss of £3256 during the previous year. Last year there was a decrease in receipts from the sale of residuals amounting to £3488. This resulted mainly from the drop in the value of coke.

The Bo'ness Gas Light Company have increased the price of gas by 5d. per 1000 c.ft. The new rates are: Ordinary consumers, 4s. 7d. per 1000 c.ft.; prepayment consumers, 5s. 1d.; and power consumers, 3s. 9d. Outlay on foreign coal is responsible for the increase. The price of coke has also been raised.

It was stated by the General Manager (Mr. A. J. Harrison) at the last monthly meeting of the Accrington and District Gas Board, that difficulties had been experienced with German and other Continental coal. What they were now getting, however, was almost all American, and they found the results nearly equal to those obtained from English coal.

The annual sports meeting of the John Wright and Eagle Range Social Club, held on Saturday, Aug. 21, proved to be the most successful in the history of the Club. A splendid athletic programme, consisting of 36 events, with over 200 entrants, was carried out. A large number of employees and friends were present. A gratifying feature was the enthusiasm manifested in the inter-works events. A generous musical programme had been arranged; and an enjoyable day terminated with dancing on the green.

The Salford Corporation Gas Committee have recommended the City Council to increase the price of gas by 6d. per 1000 c.ft., from 3s. 10d. to 4s. 4d. Since the beginning of the coal stoppage the Committee have purchased 31,000 tons of coal at approximately 47s. 6d. a ton, as against 27s. 10d. before the dispute, resulting in a loss of £43,000. This, together with a deficit and loan from last year, has produced an adverse balance of about £79,000. An increase of 8d. per 1000 c.ft was first proposed, but this was defeated in favour of 6d., which will yield about £42,000 a year.

STOCK MARKET REPORT.

A STUDY of the financial and stock market reports leaves one with a mixed bag of conclusions with regard to the Stock Exchange business of last week—optimistic views as to the prospect of a termination of the coal stoppage, and pessimistic views of profit prospects for the current year; hopes of improvement in the values of Industrials at the end of the coal conflict, but warnings that appreciation in such shares may have already been discounted. There is little doubt, however, that, in spite of the holiday season, a fair amount of business continues to be transacted. Plenty of money appears to be available for investments, and securities offering scope for capital appreciation were being sought after. A substantial amount of business was done in the popular shares. Gilt-edged and other investment securities were not neglected, but the transactions were, perhaps, slightly less than usual. Home Rails recovered at the outset, influenced doubtless by the hint that the negotiations between the miners and mineowners would be resumed, but the improvement was short-lived. Electric Construction shares continued firm; and the offer of 13s. per share to the Edison Swan shareholders attracted a good deal of interest and speculation.

There is nothing adverse to report with regard to the Gas Market. The rise of five points in the Alliance and Dublin Ordinary is very satisfactory, as the stock has been depressed for some time. It is felt that the improvement is a sure indication of better times to come. The Sheffield stocks rose 1 point at the local exchange; and it will be seen that there were a large batch of *ex* div. reductions in quotations.

The following transactions were recorded during the week:

On Monday, Aldershot 4 p.ct. preference 66, Bournemouth 6 p.ct. preference 11⅞, Gas Light and Coke 83⅞, 84, 84⅛, 84¼, 84⅜, Montevideo 80, Primitiva 10s. 4½d., 10s. 6d., 10s. 9d. Supplementary prices, Barnet "D" 102¼, Brighton and Hove 5 p.ct. debenture 92½, Gas Light and Coke 5 p.ct. debenture 99, Liverpool 5 p.ct. 78½.

On Tuesday, Alliance and Dublin 81, 81½, Brighton and Hove 10 p.ct. 171, Gas Light and Coke 83¾, 84, 84½, 3½ p.ct. maximum 60½, 4 p.ct. preference 75½, 75¾, 3 p.ct. debenture 58½, 59, Imperial Continental 124, 125, Primitiva 10s. 4½d., South Metropolitan 91¾, South Suburban 5 p.ct. 96½. Supplementary prices, British (Norwich) 4 p.ct. debentures 72¾, British (Hull) 4 p.ct. debentures 72¾, Gas Light and Coke 5 p.ct. debenture 99, 99½.

On Wednesday, Bournemouth 6 p.ct. preference 11½, 11⅝, British 104½, Cape Town 4¼ p.ct. debenture 70⅝, Commercial 3½ p.ct. 74, 76¾, Continental Union 7 p.ct. preference 86, European 95s., Gas Light and Coke 83¾, 84, 84¼, 84½, 3½ p.ct. maximum 59¾, 60, 4 p.ct. preference 75, 76, 3 p.ct. debenture 58½, 59½, Imperial Continental 123¾, 124¼, Montevideo 79½, Newcastle 3½ p.ct. 69, South Metropolitan 91½, South Suburban 5 p.ct. 95½, 97. Supplementary prices, Brighton and Hove 5 p.ct. debenture 95, British (Norwich) 4 p.ct. debentures 73, Gas Light and Coke 5 p.ct. debenture 99, Gas Light and Coke (Brentford) 7½ p.ct. 102, Wakefield 5 p.ct. maximum, 78.

On Thursday, Bournemouth "B" 12⅜ *ex* div., 6 p.ct. preference 11⅜ *ex* div., British 104¾, Commercial 3½ p.ct. 76¾, Croydon 95¼, 96½, maximum dividend 79, European 99s. 4½d., Gas Light and Coke 84, 84¼, 84⅜, 84½, Hong Kong and China 20, 20¼, Imperial Continental 124, Montevideo 79½, Newcastle 3½ p.ct. debenture 68 9/16, Primitiva 10s. 9d., South Metropolitan 91¾, South Suburban 5 p.ct. 95½, 96½. Supplementary prices, Broadstairs 7 p.ct. "D" 81½, Gas Light and Coke 5 p.ct. debenture 99, Southend new 80, 80½, "B" 78½, 79, Sutton 106½, 107, Worthing 89½.

On Friday, Bombay 20s. 9d., 21s., British Gas Light 104½, 104¾, European 95s., 97s. 6d., Gas Light and Coke 84, 3 p.ct. debenture 58½, 59¼, Imperial Continental 123, Primitiva 10s. 4½d., South Metropolitan 91½. Supplementary prices, Gas Light and Coke 5 p.ct. debenture 99.

The stringency which prevailed in the Money Market at the beginning of the week was in sharp contrast to the plentiful supply at the close. On Friday, after the rate had dropped to 3 p.ct., money was practically unlendable. The further decline in the New York Exchange and the high rate—£4 14s. 3·39d. p.ct.—which the Treasury had to pay for Bills, created very different conditions in the discount market.

In the Foreign Exchange Market, there was a slight decline at the end of the week in sterling on New York, which finished at $4.85 5/32. French and Belgian francs were firmer, the Paris rate closed at 168⅞, while the Brussels Exchange closed at 175½. A small rise occurred in the Milan rate to 149⅛ lire, and the Dutch quotation continued to move against this country, closing at 12.11⅛ fl.

Silver was higher on Indian "bear" covering, and the spot price rose to 29 1/16d. per oz. No Gold movements were reported; but the price was ¼d. dearer at 84s. 11½d. per oz.

The Bank Rate is 5 p.ct., to which it was raised from 4 p.ct. on Dec. 3. Bankers' deposit rates are 3 p.ct. The deposit rates of the discount houses are 3 p.ct. at call and 3¼ p.ct. at notice.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr	Dividends. Last Hf. Yr.	NAME.	Quotations. Aug. 27.	Rise or Fall on week.	Transactions Lowest and Highest Prices.
£			%p.a.	% p.a.				
171,978	Stk.	Aug. 12	5	5	Aldershot 5 p.c. max. C.	72—75	..	..
322,992	,,	,,	4	4	Do. 4 p.c. Pref.	65—70	..	66
1,551,868	,,	Apl. 1	6¼	6¼	Alliance & Dublin Ord.	80—85	+5	81—81½
374,000	,,	July 8	4	4	Do. 4 p.c. Deb.	60—65	..	..
300,000	1	May 6	1/7⅛	1/7⅛	Bombay, Ltd.	1 5/16—1 7/16	..	20/9—21/-
170,000	10	Aug. 26	8½	8½	Bournemouth 5 p.c.	11⅜—12⅝*	−¼	..
500,050	10	,,	7	7	Do. B 7 p.c.	11⅜—12⅝	..	12⅝
275,000	10	,,	6	6	Do. Pref. 6 p.c.	11—12*	..	11 5/16—11⅝
50,000	Stk.	June 24	3	3	Do. 3 p.c. Deb.	54—57	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb.	74—77	..	..
214,740	,,	Aug. 26	12	12	Brighton & Hove Orig.	163—168*	−4	171
244,200	,,	,,	9	9	Do. A Ord.	125—130*	−3	..
1,287,500	,,	July 22	5	5	Bristol 5 p.c. max.	86—87*a*	..	..
855,000	,,	Mar. 18	8	7	British Ord.	100—105	..	104½—104¾
100,000	,,	June 24	7	7	Do. 7 p.c. Pref.	114—119	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	68—73	..	..
100,000	10	June 10	6	8	Cape Town, Ltd.	6½—7½	..	..
100,000	10	Apl. 22	4½	4½	Do. 4½ p.c. Pref.	6—7	..	..
150,000	Stk.	June 24	4½	4½	Do. 4½ p.c. Deb.	66—71	..	70½
626,860	,,	July 22	6	6	Cardiff Con. Ord.	94—97	..	..
237,860	,,	June 24	7½	7½	Do. 7½ p.c. Red. Deb.	99—102	..	..
157,150	,,	Aug. 12	6½	5	Chester 5 p.c. Ord.	88—93*b*	..	..
79,185	1	Apl. 22	†2/-	†2/-	Colombo Ltd. Ord.	28/—30/-	..	..
24,495	1	,,	1/4⅜	1/4⅜	Do. 7 p.c. Pref.	20/—22/-	..	..
1,513,280	Stk.	Aug. 12	5⅛	5⅛	Commercial 4 p.c. Cap.	76—79	..	..
560,000	,,	,,	5/3/4	5/3/4	Do. 3½ p.c. Cap.	74—77	..	74—76½
475,000	,,	June 24	3	3	Do 3 p.c. Deb.	55—58	..	..
800,000	,,	Oct. 8	—	4	Continental Union, Ltd.	25—30	..	..
200,000	,,	Mar. 4	7	7	Do. 7 p.c. Pref.	85—88	..	86
737,150	,,	Aug. 12	6½	6½	Croydon sliding scale	94—97	..	95½—96½
403,100	,,	,,	5	5	Do. max. div.	77—80	..	79
492,270	,,	Aug. 26	6	9	Derby Con.	107—109*c*	..	..
55,000	,,	June 24	4	4	Do. Deb.	73—75*c*	..	..
209,000	,,	Mar. 4	5	5	East Hull Ord. 5 p.c.	86—89	..	..
50,000	,,	June 24	5	5	Eastbourne 5 p.c. Deb.	91—96	..	..
1,002,180	10	Apl. 1	†6	†4	European, Ltd.	4½—5½	..	95/—99/4½
18,788,960	Stk.	Aug. 12	4/17/4	5/1/4	Gas Light & Coke 4 p.c. Ord.	83—85	..	83¾—84½
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	58—61	..	59¾—60½
4,157,020	,,	,,	4	4	Do. 4 p.c. Con. Pref.	74—77	..	75—76
5,602,620	,,	June 24	3	3	Do. 3 p.c. Con. Deb.	58—61	..	58½—59½
181,315	,,	,,	—	—	Do. 6 p.c. Br'tf'd Rd. Db.	100—105	..	..
130,000	,,	—	10	10	Do. 10 p.c. Bonds.	..	..	..
42,000	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb.	..	..	..
82,500	,,	Aug. 26	6⅝	6⅝	Hastings & St L. 5 p.c. Conv	86—91*	−2	..
258,740	,,	,,	5⅝	5⅝	Do. 3½ p.c. Conv.	66—71*	−2	..
70,000	10	June 10	†10	†10	Hongkong & China, Ltd.	19½—20½	..	20—20½
173,200	Stk.	Mar. 4	5	5	Hornsey Con. 3½ p.c.	69—71	..	..
1,976,000	,,	May 20	10	‡10	Imperial Continental Cap.	120—125	..	123—125
226,170	,,	Aug. 12	3½	3½	Do. 3½ p.c. Red. Deb.	68—71	..	..
235,242	,,	Aug. 12	6½	6½	Lea Bridge 5 p.c. Ord.	92—97	..	..
2,127,340	,,	Aug. 12	5½	5½	Liverpool 5 p.c. Ord.	78½—79½*b*	..	..
600,000	,,	Mar. 18	7	7	Do. 7 p.c. Red. Pref.	102½—104½*b*	..	..
165,786	,,	Aug. 26	9	8	Maidstone 5 p.c. Cap.	112—117*	−3	..
63,480	,,	June 24	3	3	Do. 3 p.c. Deb.	53—58	..	..
75,000	5	June 24	†6	†7	Malta & Mediterranean	5½—5⅝	..	..
541,920	Stk.	May 20	†4	†6	Montevideo, Ltd.	79—82	..	79½—80
2,061,315	,,	Aug. 12	5	5	Newcastle & Gateshead Con.	69½—69¾*d*	..	..
360,929	,,	,,	4	4	Do. 4 p.c. Pref.	73—74*d*	..	..
529,705	,,	June 24	3½	3½	Do. 3½ p.c. Deb.	68¾—69*d*	..	..
15,000	,,	Aug. 26	11½	11½	North Middlesex 10 p.c.	151—156*	−4	..
91,530	,,	,,	8 5/16	8 5/16	Do. 7 p.c.	109—114*	−3	..
300,000	Stk.	May 6	9	7	Oriental, Ltd.	96—101	..	..
188,120	,,	June 24	7⅞	7⅞	Plym'th & Ston'house 5 p.c.	108—113	..	..
60,000	50	Mar. 4	14	14	Portsea Island B	—	..	..
100,000	50	,,	13	13	Do. C	—	..	..
2,389,909	1	—	—	—	Primitiva Ord.	10/—11/-	+·/8	10/4½—10/9
282,200	100	June 1	4	4	Do. 4 p.c. Red. Deb.	83—85	..	..
600,000	Stk.	July 22	4	4	Do. 4 p.c. Red. Deb. 1911	65—67	..	..
180,305	,,	June 24	4	4	Do. B. Aires 4 p.c. Rd. Db.	65—67	..	..
256,847	,,	,,	4	4	Do. R'r P'te 4 p.c. Rd. Db.	65—67	..	..
150,000	10	Mar. 18	6	6	San Paulo 6 p.c. Pref.	7⅜—8⅛	..	..
125,000	50	July 1	5	5	Do. 5 p.c. Red. Deb.	44—47	..	..
270,000	Stk.	Mar. 18	5½	†6	Sheffield A	99—101*e*	+1	..
419,368	,,	,,	5½	6	Do. B	99—101*e*	+1	..
1,047,000	,,	,,	5½	6	Do. C	99—101*e*	+1	..
90,000	10	June 11	4	—	South African	5—7	..	..
6,609,895	Stk.	Aug. 12	7	5	South Met. Ord.	90¼—92½	..	91½—91¾
1,895,445	,,	July 8	3	3	Do. 3 p.c. Deb.	57—60	..	..
734,000	,,	Mar. 4	6½	6½	Do. 6½ p.c. Red. Db.	102—104	..	..
91,500	,,	Aug. 12	8½	8½	South Shields Con.	114—116*d*	..	..
1,187,795	,,	Aug. 12	6½	6½	South Suburban Ord. 5 p.c.	95—98	..	95½—97
368,837	,,	June 24	5	5	Do. 5 p.c. Deb.	92—95	..	..
647,740	,,	Mar. 18	5	5	South'mpton Ord. 5 p.c.max.	77—80	..	..
121,275	,,	June 24	4	4	Do. 4 p.c. Deb.	68—73	..	..
250,000	,,	Aug. 26	7	7	Swansea 7 p.c. Red. Pref.	98—101*	−2	..
200,000	,,	June 24	6½	6½	Do. 6½ p.c. Red. Deb.	99—101	..	..
120,000	,,	July 22	7½	7½	Tottenham District A 5 p.c.	105—110	..	..
882,275	,,	,,	5⅞	6½	Do. B 3½ p.c.	87—90	..	..
150,000	,,	,,	5½	5½	Do. 5½ p.c. Pref.	99—101	..	..
181,355	,,	June 10	4	4	Do. 4 p.c. Deb.	73—76	..	..
258,251	,,	Aug. 26	5	5	Tynemouth Con. and New	67½—68½*d*	..	..
197,294	,,	Aug. 26	6⅝	6⅝	Uxbridge, Maidenhead, & Wycombe 5 p.c.	85—90*	−2	..
88,330	,,	,,	5	5	Do. 5 p.c. pref.	80—85*	−2	..
91,800	,,	,,	6⅝	6⅝	Do. 5 p.c. Maidenh'd	85—90*	−2	..
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	July 8	8½	8½	Wandsworth A 5 p.c.	122—127	..	..
255,636	,,	,,	7	7	Do. B 3½ p.c.	102—107	..	..
412,450	,,	,,	5/19/0	5/19/0	Do. C and New	88—93	..	..
352,000	,,	,,	6⅝	6⅝	Wimbledon 5 p.c.	98—103	..	..
98 000	,,	,,	7½	7½	Epsom 5 p.c.	104—109	..	..
88,416	,,	June 24	3	3	3 p.c. Deb.	54—57	..	..

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